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# ON EXTERNAL AID EFFECTIVENESS AND SCHOOL ENROLMENT: A STUDY ON SUB-SAHARAN AFRICA

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A b s t r a c t

This paper re-evaluates the external aid effectiveness on school enrolment in Sub-Saharan Africa and provides a piece of evidence on the relationship conditioned on the prevalence of malaria and HIV/AIDS. A panel dataset from 2010 to 2019 for 42 countries in Sub-Saharan Africa was modelled and analyzed using a dynamic panel GMM technique. The results suggest a statistically significant positive effect of external aid on school enrolment – primary, secondary and tertiary school enrolment. However, when correlated with the HIV/AIDS and malaria diseases, the relationship turned insignificant and at best negative. That is, in the case where malaria and HIV/AIDS diseases are evident, external aid does not have a statistically significant positive impact on school enrolment. It therefore means that the level of aid effectiveness on school enrolment is contingent on malaria and HIV/AIDS diseases in the region. Hence, although the attraction of more external aid can increase school enrolment in Sub-Saharan Africa, it will be effective only if the HIV/AIDS and malaria diseases are eradicated.

# W SPRAWIE SKUTECZNOŚCI POMOCY ZEWNĘTRZNEJ I ZAPISÓW DO SZKÓŁ – STUDIUM O AFRYCE SUBSAHARYJSKIEJ

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A b s t r a k t

W artykule ponownie oceniono skuteczność pomocy zewnętrznej w zakresie zapisów do szkół w Afryce Subsaharyjskiej i przedstawiono dowody na zależność uwarunkowaną występowaniem malarii i HIV/AIDS. Zestaw danych panelowych z lat 2010-2019 dla 42 krajów Afryki Subsaharyjskiej wymodelowano i przeanalizowano technikami dynamicznego panelu GMM. Wyniki sugerują statystycznie istotny pozytywny wpływ pomocy zewnętrznej na zapisy do szkół - podstawowych, średnich i wyższych. Związek stał się nieistotny, a w najlepszym razie negatywny, kiedy wchodził w interakcję z chorobami HIV/AIDS i malarią. Oznacza to, że jeśli malaria i choroby HIV/AIDS są ewidentne, to pomoc zewnętrzna nie ma statystycznie istotnego pozytywnego wpływu na zapis do szkoły. Oznacza to zatem, że poziom skuteczności pomocy w zakresie zapisów do szkół zależy od malarii i chorób HIV/AIDS w regionie. Większa ilość pomocy zewnętrznej może zwiększyć liczbę uczniów zapisujących się do szkół w Afryce Subsaharyjskiej, będzie ona jednak skuteczna tylko wtedy, kiedy zostaną wyeliminowane choroby HIV/AIDS i malaria.

# Introduction

A large funding gap stemming from the overwhelming shortage of local resources remain a top constraint to the development of a sound educational system in sub-Saharan Africa. The consequences range from increased sociopolitical unrest and terrorism to poor education outcomes which include large numbers of out-of-school children, truancy and low school enrolments. Many countries in sub-Saharan Africa lack appealing school infrastructures to motivate a sustained rapid growth in school enrolment on a regular basis. Today, sub-Saharan Africa houses vast numbers of young people who are much less likely to enroll in school or continue with education at advanced levels of study. The situation is salvageable if the resources meant for the development of other sectors are diverted to the education sector and domestic resources are augmented to contain education sector needs using external resources or aid. The first option poses more danger: there would be a serious underdevelopment of other sectors. Since the educational sector also depends on the performance

of some of these sectors, their poor state will in turn hinder educational sector development. In the end, no progress is attained; the overall national development is halted. Reckoning on the latter, that is external aid, as an alternative, also come with costs, albeit less damaging than the resource diversion among sectors.

Such costs include an overdependence on external assistance resulting in the susceptibility of the aid-recipient economy to adverse external shock and a loss of self-esteem. To a reasonable extent, where these costs are minimized, external aid is a good means to bridge the education funding gap to step up the school enrolment rate in sub-Saharan Africa. The illustration posed by Easterly (2003, p. 40) where an external aid water project provided reduced the numbers of out-of-school children and foster school enrolment in a village in Ethiopia is an example. Although the Easterly (2003, p. 40) illustration is based on an individual example or is relegated to microanalysis, ample examples of macro studies have found a direct positive relationship whereby school enrolment rates expand with a rise in the level of external aid disbursed. For instance, Moe (2008, p. 202-221) evaluated the casual link between educational development and Official Development Assistant (ODA) in Southeast Asian countries between 1990 and 2004 and found a positive and significant impact of both the general and education-specific ODA on secondary and post-secondary schools. Also, Dreher, Nunnenkamp and Thiele (2006, p. 291-314) in their study covering 96 low and middle-income countries found a positive impact of aid allocation on school enrolment.

Furthermore, the study of Adediyan and Obadoni (2020, p. 68-85) found a direct positive effect of external aid on school enrolment. However, there are other researchers that are pessimistic on the positive impact of external aid on school enrolment or education (e.g. Moyo, 2009a, p. 7-208; 2009b, p. 1-5; Rena, 2008, p. 2), and even in some cases, a negative relationship is documented. Nevertheless, a recent trend in the external aid literature is the debate that the nature of the impact of external aid or how effective external aid could be is conditioned on the interfering role of other factors in the economic relationship under investigation. These factors include the level of the aid recipient countries macroeconomic policy management, institutional quality, and the size of government. A good case in point is the study of Qayyum and Haider (2012, p. 97-116) that questioned the effectiveness of external aid in the absence of the role of institution. Likewise, while Burnside and Dollar (2000, p. 847-868) conditioned the effectiveness of external aid to good economic policies, Guillaumont and Chauvet (2001, p. 66-92) found it contingent on hazards and shocks (environmental factors); while Collier and Dehn (2001, p. 1-25) looked at negative supply shocks.

Unfortunately, there are studies that have also reported contradictory results. For instance, Rajan and Subramanian (2008, p. 643-665) in their cross-country analysis found that external aid inflow has no effect on national output even when contingent on good economic policies. This paper takes the debate further

by assessing the effectiveness of external aid on school enrolment where there is a disease outbreak using sub-Saharan Africa as a case study. Two variants of endemic illness are at the heart of the paper: the HIV/AIDs and malaria diseases. Sub-Saharan Africa remains undoubtedly one of the world's regions most badly hit by the HIV/AIDs and malaria diseases over the years. The severity of the HIV/AIDs and malaria outbreaks have gotten worse in recent years in sub-Saharan Africa following the outbreak of the Covid-19 global pandemic that drastically bends low the efforts of the government and non-governmental bodies at curtailing the diseases (WHO, 2020, p. 15-25). It is increasingly worrisome that the incidence of HIV/AIDs and malaria is expanding daily with its grave negative consequences, both direct and indirect, cutting across the overall external aid allocation processes, and importantly, the implementation, monitoring and coordination of external aid specific education projects.

As a result, how well external aid is expected to determine educational behaviours, particularly school enrolment, is rarely actualized under the influence of HIV/AIDs and malaria. The central objective of this study is therefore an empirical evaluation of whether external aid allocation to the education sector is effective in raising school enrolment in sub-Saharan Africa under the interfering influence of the HIV/AIDs and malaria outbreaks. The structural categorization of the remaining part of the paper is as follows: a literature review is in section 2, section 3 is the methodology, and sections 4 and 5 contain results, analysis and a conclusion.

## Methodology and data

Disease is only one of several factors determining not just the level of aid allocation to different sectors, but the level of compliance of donors to timely use the externally funded projects, which in turn affects the potential school enrolees' decision whether or not to enrol at a given level of education. To understand the intrusive role of diseases on the effectiveness of external aid on school enrolment particularly in sub-Saharan Africa, two objective functions: the peripheral and major objectives as in equation 1 and 2 are specified. The peripheral objective function highlights the individual direct impact of external aid and diseases on school enrolment as follows:

$$SE_{it} = \beta_0 + \beta_1 \ln E_{it} + \beta_2 \ln D_{it} + \beta_3 \ln F_{it} + \beta_4 EP_{it} + \mu_{it} \tag{1}$$

$$i = 1, 2, 3, …, 42 \qquad t = 1, 2, 3, …, 10$$

Equation (1) primarily constrained school enrolment (*SE*) on external aid (*E*) and disease (*D*). Definitionally, the school enrolment consists of the gross primary (*P*), secondary (*S*) and tertiary (*T*) school enrolment level. The external

aid variable (*E*) refers to the total external aid disbursement, disbursed to the education sector in sub-Saharan Africa by the Development Assistance Committee (DAC) countries, measured at the 2018 US dollar constant price. Disease is measured using two indexes: malaria incidence and the HIV/AIDS prevalence. A positive relationship is expected between external aid and school enrolment. Consequently, it follows that the effectiveness of aid on school enrolment is indicated by the positive (and significant) impact of external aid. However a negative relationship is expected between the school enrolment level and disease. For the secondary explanatory variables, fiscal policy (*F*) and employment level (*EP*), the fiscal policy is indicated by the general government spending and employment variable as a ratio of employment to total population, both are expected to be positive.

For the major objective function, the impact of disease on the relationship between school enrolment and external aid effectiveness is modelled as

$$SE_{it} = \alpha_0 + \alpha_1 \ln E_{it} + \alpha_2 \ln D_{it} + \alpha_3 \ln(E \times D)_{it} + \alpha_4 \ln F_{it} + \alpha_5 EP_{it} + \mu_{it} \quad (2)$$

$$i = 1, 2, 3, …, 42 \qquad t = 1, 2, 3, …, 10$$

Equation (2) is an interactive model describing the indirect impact of disease and external aid on school enrolment in sub-Saharan Africa. The coefficient of the parameter,, is expected to be positive and significant if disease outbreak (HIV/AIDS and malaria) does not hamper the positive effect of external aid on school enrolment. That is, the coefficient will be positive and significant if external aid effectiveness on school enrolment does not depend on the spread of disease in sub-Saharan Africa. To estimate the parameter coefficients of equations (1) and (2), a dynamic panel GMM technique is employed. The technique enables the construction of the dynamics of the objective functions of the study. For instance, the current level of school enrolment may depend on the past level; a dynamic panel GMM adequately captures such a relationship, and controls the resulting dynamic endogeneity problem and simultaneously bias (Verbeek, 2004, p. 148-150; Asteriou & Hall, 2011, p. 433; Arellano & Bond, 1991, p. 277-297). The study used a panel dataset consisting of 42 selected countries in Sub-Saharan Africa, spanning between 2010 and 2019. The selected countries in the region are those with an updated dataset with regards to the key variables of the model. The data collected were on HIV/AIDS prevalence, malaria incidence, fiscal policy (general government expenditure), gross school enrolment rate and employment rate, gathered from the World Bank Development Indicators database. Also, data on external education aid disbursement were used, and were collected from the OECD/Development Assistance Committee (DAC) Credit Reporting System (CRS) online database.

# Empirical findings

The empirical results of the study are presented in Tables 1 and 2. Table 1 highlights the direct effects of the diseases, HIV/AIDs and malaria, and external aid allocation on primary, secondary and tertiary school enrolment in sub--Saharan Africa with the fixed effect in the model controlled. It is quite clear in Table 1 that the primary, secondary and tertiary school enrolment increases with a period lag. Also, the external aid allocation has a statistically significant positive effect on primary, secondary and tertiary school enrolments. It thus follows from the estimated coefficient of external aid that school enrolment at the primary, secondary and tertiary levels increases or decreases with a rise or a fall in the total amount of external aid allocated by the donors. Although the obtained positive relationship between external aid allocation and school enrolment is significant only at a 10 per cent level for the primary school level, it is statistically significant at a 5 per cent level for the secondary and tertiary education levels and it suggests that the positive impact of external aid on school enrolment is more pronounced at the secondary and tertiary education levels compared to the primary school level over the sample period.

The impact of HIV/AIDs in Table 1 is negative and statistically significant at a 5 per cent level in the case of school enrolment at the secondary and tertiary levels, but positive and insignificant at the primary school level. One reasonable justification of a cause may hinge on the level of stigmatization attached to HIV/AIDs victims across all levels of education. Specifically, at the primary school level pupils, especially at the lower level of primary education, are less aware of the implications of HIV/AIDs. Therefore, the HIV/AIDs infected ones are less likely to face severe stigmatization from their colleagues which motivates additional HIV/AIDs infected enrollees in primary school. But at the secondary and tertiary levels, the level of stigmatization of HIV/AIDs patients is much higher and therefore serves as a disincentive for the HIV/AIDs infected potential secondary and tertiary school enrollees to undertake schooling.

Thus, at a high level of education, the effect of HIV/AIDs is negative. As expected, the impact of malarial disease on primary, secondary and tertiary school enrolment is negative and statistically significant at a 5 per cent level. That is, there is clear statistical evidence that a rise in the level of malarial disease decreases school enrolment at the primary, secondary and tertiary school levels, and vice-versa. The school enrolment at the primary level is the most sensitive to a change in the level of malaria among the levels of education with the tertiary school enrolment level as the least. This paints a picture of a diminishing impact of malarial disease as the level of education rises, say, from the secondary to the tertiary level. Since, at an advanced level of education, enrollees are much better able to detect the symptoms of malaria at its early stage of development for a proper treatment. Also, they are well aware of the various methods of malaria prevention.

The estimated negative impacts of malaria and HIV/AIDS validate the study of Komarulzaman, Jong and Smiths (2019, p. 633-646) and Zinyemba, Pavlova and Groot (2020, p. 35-84) that disease has a negative impact on education. The estimated impact of the fiscal policy variable in Table 1 is negative and statistically insignificant at any level of statistical test. Consequently, an expansionary fiscal policy is likely not a good policy variable to drive up school enrolment in sub-Saharan Africa. The ineffectiveness of fiscal policy in the management of school enrolment at the primary, secondary and tertiary education levels is largely a result of corruption, public funds mismanagement and bureaucratic processes surrounding the use of fiscal policy in most countries of sub-Saharan Africa. Lastly, the ratio of employment to the population has an insignificant effect on school enrolment at the primary and secondary education levels, but has a significant positive impact at 10 per cent on tertiary school enrolment, mainly as a result of job prospects after school completion.

Table 1

Estimated models of School Enrolment

| Regressors | Primary level | Secondary level | Tertiary level |
|---|---|---|---|
| P(-1) | 0.17 (0.04)* | – | – |
| S(-1) | – | 0.28 (0.00)* | – |
| T(-1) | – | – | 0.30 (0.02)* |
| E | 29.02 (0.07)** | 1.81 (0.04)* | 0.55 (0.02)* |
| M | -6.68 (0.01)* | -5.87 (0.00)* | -1.38 (0.00)* |
| H | 0.30 (0.83) | -1.46 (0.04)* | -0.46 (0.02)* |
| F | -0.47 (0.46) | -0.21 (0.24) | -0.46 (0.12) |
| EP | -0.14 (0.70) | 0.04 (0.63) | 0.04 (0.09)** |
| C | -20.78 (0.19) | -9.40 (0.24) | -7.02 (0.00) |
| AR(1) | -4.38 (0.00) | -4.34 (0.00) | -3.93 (0.00) |
| AR(2) | -1.00 (0.32) | -0.36 (0.72) | 1.14 (0.25) |
| Sargan test | 3.40 (0.49) | 0.39 (0.82) | 1.28 (0.26) |
| No. of Instrument | 20 | 18 | 17 |
| No.of Groups | 42 | 42 | 42 |
| Obs. | 373 | 376 | 374 |

Note that the * and ** means the attached coefficient is significant at 1%, 5% and 10%, respectively. The coefficients of the period effect are not reported.
Source: authors.

Table 2

Estimated interactive models of School Enrolment

| Variables | Primary level | | | | Secondary level | | | | Tertiary level | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (1) | (2) | (3) | (4) | (1) | (2) | (3) | (4) |
| P(-1) | 0.24 (0.00)* | 0.34 (0.00)* | 0.20 (0.04)* | 0.30 (0.18) | | | | | | | | |
| S(-1) | | | | | 0.27* (0.00)* | 0.27* (0.00)* | 0.28* (0.00)* | 0.38 (0.05)** | | | | |
| T(-1) | | | | | | | | | 0.48 (0.05)** | 0.52 (0.03)* | 0.48 (0.05)** | 0.15 (0.53) |
| E | -21.97 (0.21) | 28.12 (0.11) | -30.29 (0.28) | 11.40 (0.91) | 0.17 (0.90) | 2.78 (0.01) | 0.77 (0.61) | -4.11 (0.82) | -0.34 (0.68) | 0.23 (0.64) | -0.42 (0.60) | -2.75 (0.28) |
| M | -13.15 (0.04)* | -5.55 (0.01)* | -15.45 (0.09)** | -2.29 (0.95) | -7.20 (0.00)* | -5.29 (0.00) | -6.90 (0.00)* | -8.40 (0.12) | -1.81 (0.04)* | -1.22 (0.04)* | -1.81 (0.04)* | -2.95 (0.02)* |
| H | -2.21 (0.19) | 21.47 (0.09)** | -8.76 (0.47) | 51.30 (0.37) | -1.75 (0.02)* | 1.84 (0.26) | 1.57 (0.34) | 41.78 (0.05)** | -0.40 (0.14) | -0.50 (0.24) | -0.60 (0.17) | -0.20 (0.96) |
| F | 0.637 (0.13) | 0.13 (0.76) | 0.62 (0.11) | 0.16 (0.89) | -0.24 (0.19) | -0.15 (0.41) | -0.17 (0.36) | -0.35 (0.56) | 0.04 (0.51) | 0.04 (0.60) | 0.04 (0.56) | 0.10 (0.23) |
| EP | 0.52 (0.01)* | 0.20 (0.43) | 0.50 (0.01)* | 0.88 (0.26) | 0.03 (0.71) | 0.05 (0.58) | 0.04 (0.65) | 0.33 (0.73) | 0.05 (0.16) | 0.05 (0.15) | 0.05 (0.19) | -0.09 (0.36) |
| E×H | | -8.28 (0.08)** | 2.39 (0.56) | 9.16 (0.73) | | -1.20 (0.03) | -1.20 (0.03)* | 10.47 (0.12) | | 0.07 (0.63) | 0.08 (0.61) | -0.10 (0.94) |

cont. Table 2

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E×H(-1) | | | | -27.3 (0.46) | | | | -25.51 (0.06)** | | | | -0.11 (0.97) |
| E×M | 4.47 (0.13) | | 5.51 (0.18) | 2.31 (0.89) | 0.50 (0.12) | | 0.63 (0.07)** | 2.40 (0.44) | 0.21 (0.14) | | 0.21 (0.13) | -0.16 (0.62) |
| E×M(-1) | | | | -1.56 (0.79) | | | | 0.85 (0.92) | | | | 1.21 (0.24) |
| C | -14.05 (0.45) | -71.39 (0.00) | 3.92 (0.93) | -37.2 (0.81) | -6.56 (0.43) | -14.71 (0.08) | -11.58 (0.18) | -10.75 (0.66) | -6.34 (0.01) | -7.24 (0.01) | -5.96 (0.02) | -7.94 (0.04) |
| AR(1) | -4.13 (0.00) | -4.31 (0.00) | -3.89 (0.00) | -2.60 (0.01) | -4.23 (0.00) | -4.19 (0.00) | -4.30 (0.00) | -2.05 (0.04) | -2.65 (0.01) | -2.93 (0.00) | -2.67 (0.01) | -3.39 (0.00) |
| AR(2) | -1.00 (0.32) | -0.97 (0.33) | -0.96 (0.34) | 0.22 (0.83) | -0.41 (0.69) | -0.13 (0.90) | -0.31 (0.75) | 0.44 (0.66) | -0.59 (0.56) | -0.50 (0.61) | -0.58 (0.56) | 0.66 (0.51) |
| Sargan test | 3.02 (0.22) | 2.15 (0.34) | 2.86 (0.24) | 7.57 (0.11) | 0.44 (0.80) | 0.53 (0.47) | 0.68 (0.71) | 0.78 (0.86) | 0.27 (0.60) | 0.26 (0.61) | 0.25 (0.61) | 0.12 (0.73) |
| No. of Instrument | 19 | 19 | 20 | 24 | 19 | 18 | 20 | 23 | 18 | 18 | 19 | 21 |
| No.of Groups | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 |
| Obs. | 371 | 373 | 371 | 371 | 374 | 376 | 374 | 374 | 372 | 374 | 372 | 372 |

Note that the * and ** means the attached coefficient is significant at 1%, 5% and 10%, respectively. The coefficients of the period effect are not reported.
Source: authors.

In each of the models of school enrolment in Table 1, the Sargan instrument restriction test is satisfied and it suggests that the three estimated models are valid.

In Table 2, estimates on the interfering effect of disease on the school enrolment and external aid relationship is summarized. Four different sub--models were reported for each level of school enrolment. In each of the levels, the first sub-model presents the coefficient estimate of the interactive effect of malarial disease and the second sub-model highlights that of HIV/AIDS. The third sub-model combines the coefficients of the interactive effect of HIV/AIDS and malaria. This is re-estimated with a lag in the fourth sub-model.

In Table 2, it is apparent that school enrolment level does not rise with more external aid under an increased menace of HIV/AIDS; at best, it is negative on the primary and secondary school enrolment levels. With a lag, the interactive effect of HIV/AIDS and external aid on primary, secondary and tertiary school enrolment is negative and significant at a 10 per cent level for school enrolment at the secondary education level only. Additionally, the impact of malaria on the relationship between external aid and school enrolment is largely positive but not statistically significant; although with a very small exception (only at the 10 per cent level) for secondary school. The lagged coefficient of the malaria and external aid interactive term is not statistically significant at all. The diagnostic test report summarized in Table 2 suggests valid instruments for the models and a lack of the second order autocorrelation.

# Conclusion

In the light of the empirical results obtained, it is true that to raise the level of school enrolment in sub-Saharan Africa increased external aid disbursement plays an active role, because external aid has a significant positive impact on school enrolment in the region. However, a growing prevalence of diseases, especially HIV/AIDS and malaria, is capable of neutralizing the positive impact of external aid on school enrolment, and in some cases, can render a detrimental impact. In essence, the outcome of the estimated interacted term in the model calls to mind that school enrolment on average does not improve with additional external aid if the impact of diseases is considered in the relationship. Therefore, it will amount to an unending waste of resources should the donors increase aid disbursement to sub-Saharan Africa to foster school enrolment without addressing the menace of diseases troubling the region.

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