



## IMPACT OF THE SECONDARY EDUCATION DEVELOPMENT PROGRAM ON ACCESS TO SECONDARY EDUCATION IN TANZANIA

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### Abstract

*Limited access to secondary education is a growing challenge especially in many developing countries, where more young individuals of secondary school age are pushed back to join higher level of education beyond primary level because of few number of secondary schools, hence continued to be less competitive in the national labor markets. Evidence suggests that, if investment in school construction interventions is made, more people will be aware about schools and other education services, hence the cost of education will be reduced and education attainments can be attained. The study used Difference in Difference (DID) multiple regression model to evaluate the impact of the secondary education development program (SEDP) on access to secondary education in Tanzania. The study employed secondary data of 2012 Population and Housing Census data from the National Bureau of Statistics (NBS) and secondary schools census data from Presidents Office Regional Administration and Local Government (PO-RALG). The study found that, SEDP has significant impact on the number of secondary schools and student enrolment in secondary schools in Tanzania. The results revealed that, number of secondary schools and students enrollment increases more in wards that have received SEDP, than it would have without SEDP intervention.*

**Keywords:** Secondary education development program (SEDP); Access to secondary education; Difference in Difference (DID) multiple regression model; Tanzania

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### INTRODUCTION

Access to education is at the heart of any national development (URT, 2011). Sustainable access to education has utility to long-term improvements in economic development, enhancing individual welfare by improving individual's economic productivity, health care, women's empowerment, and improvements in gender parity between females and males. It is on this root that suitable access to education, skills, and knowledge are means of redeeming the nation from the poverty trap (Lewin, 2008). Globally, access to secondary education is growing rapidly due to achievements attained from the expansion of primary education (UNESCO, 2010). Thus, global is strived on improving esteemed educational access beyond the primary level because currently globalized society, skills, and knowledge increasingly hold the key to a country's economic growth and future development respectively (Bloom, 2006). However, in many developing countries, more young individuals of secondary school age are held back to join higher level of education beyond primary level because of few secondary schools, thus continued to be less competitive in the national labor markets (ILO, 2020). In LA countries secondary education participation rate is higher than in Sub-Saharan African countries (SSA). Brazil had a gross enrollment of 106 percent compared to Guatemala in North America which

had 51 percent of individuals who enrolled in secondary schools. Likewise, SSA has lower secondary education participation rates but has achieved to increase access to secondary education from 19 percent in 1999 to 30 percent in 2004. Countries like South Africa, Botswana, and Cape Verde have achieved to improve educational access to secondary by about 80% while Rwanda, Burundi, and Burkina Faso have failed to reach rates of 20% (Moore et al, 2008).

Tanzania like other developing countries in the world has strived to improve access to secondary education. Tanzania had adopted various education sector development program (ESDP) aimed to ensure equal access to quality education for citizens in the country. In 2004 Tanzania introduced the Secondary Education Development Program (SEDP) aimed to achieve the national goals of secondary education provision and bring about national and international reforms on the education sector in Tanzania. The program was operated under the umbrella of ESDP and was implemented in five phases each year starting between 2004 and 2009. The reforms that SEDP operated with were based on the key policy documents including National Strategy for Growth and Reduction of Poverty (NSGRP) which is also known as MKUKUTA in Swahili, Education and Training Policy of 1995, and Millennium Development Goals (MDGs) of 2025. SEDP was implemented by various stakeholders including the Ministry of Education, Science and Technology (MEST), President Office-Regional Administration and Local government; Regional Secretariats; Ward level officers; School construction Boards and Development Partners (URT, 2018).

SEDP was motivated by the achievements of the Primary Education Development Program (PEDP). PEDP was the first outcome of ESDP which was implemented between 2002 and 2006, covered primary education provision. The program intended to provide an opportunity for all Tanzanians of the primary school age to access primary education (Rajani & Omondi, 2003). PEDP had shown a significant impact on the education sector in Tanzania, as many primary schools were built from 2001 (11,873 schools) to 2006 (14,700 schools) to expand access to primary education and which finally led to an increase in the enrollment rate of primary school-aged children from 59% in 2000 to 97% in 2006 (URT, 2016). These results of PEDP have created huge demand for secondary education in Tanzania.

Despite the remarkable results of PEDP, the majority of qualified primary schools leavers were not enrolled in secondary schools due to limited access to secondary education (HDD, 2007). According to national data (2004), the total number of secondary schools were 1083 schools, among them 649 were public schools and 434 were private schools. These secondary schools

were few to provide access to secondary schooling to all secondary-aged individuals in the country (Kalinga, 2008). Since, only 147,490 students (30.1%) out of 490,018 primary school leavers were able to enroll to form one in 2003 while many of them (69.9%) were held back with basic primary education, hence failed to make transition from primary to secondary education (SADEV, 2010). Therefore, another program (SEDP) was introduced between 2004 and 2009 with the major aim of improving access with equity to secondary education in Tanzania (URT, 2004). This is because, limited access to education beyond primary education for students might lead to student's failing to gain knowledge, skills, and experience needed in their career development and life in general. As a result, a nation will fail to achieve sustainable economic development and eradicate poverty, due to the presence of large number of poorly educated citizens.

There are various researchers that have examined the impact of different education programs on education such as Hotte and Deschenes (2019) in Benin, Ingwersen, and Kazianga (2019) in Burkina Faso, Ashraf (2020) in Zambia, Huq, and Rahman (2008) in Bangladesh, Urassa and Haule (2015) as well as Malisa (2012) in Tanzania. These studies provide insights into the importance of various intervention programs implemented to improve the education sector as intended in this study. The studies provide clear evidence that there is a causal and effect of an educational intervention program on education outcomes. Nevertheless, most of these studies examined the impact of primary education interventions on primary education. Further, some studies employed correlation methods to determine the impact of SEDP on education before and after the program. Additionally, this study examine the impact of secondary education development program on access to secondary education, and little is known on the impact of this program on the number of secondary schools and student enrollment especially when used DID model. Therefore, this study aimed to fill these knowledge and methodological gap by evaluating the impact of secondary education development program on access to secondary education in Tanzania using Difference in Difference multiple regression model. The main contribution of this study to the body of knowledge is that, the study adds the methodological approach in the literature by evaluating the impact of SEDP on access to secondary education while controlling for other time variant factors that could affect the program impact on the outcome variables especially in the Tanzanian context. Therefore, this study contributed to the literature because it adds new methodological knowledge on program evaluation.

The other sections of the study are structured as follows; Section 2 provide the conceptual framework. Section 3 highlights the methodology, Section 4 presents the results and discussions of the study. Finally, the last section presents the conclusion, and recommendations. A simple framework was used to explore the relationship between the program (SEDP) as the independent variable and the outcomes (number of secondary schools and student enrollment) as dependent variables, in a way that clarifies the important assumption for unbiased estimation results of the true impact of SEDP on the study outcomes. Thus, the framework indicates, that for the number of schools to increase and enrollment of students to expand there should be an education intervention (SEDP) which will create an environment that will motivate individuals to have access to education in the society. Therefore, there is a relationship between the program and the outcomes. All of these generally make expansion of secondary education.

## **METHOD**

### **Data Type and Sources, Study area, Sample Size and Power Calculations**

The study employed secondary data that were 2012 Population and Housing Census data from the National Bureau of Statistics (NBS) and 2000-2012 School Census data obtained from President's Office Regional Administration and Local Government (PORALG) in Tanzania. These data comprised region name, district name, and ward name together with their codes. The school census data were covered all Tanzanian schools with their year of establishment together with ownership of both public and private schools. The study was implemented in ward level and covered targeted individuals who were either of secondary school age as of 2004 or those who were of secondary school age between 2004 and 2012 only on Tanzania's mainland with 25 regions excluding the Dar es salaam region and the islands of Zanzibar. Additionally, the longitudinal cohort research design was used, since participants do not have the outcome of interest to begin with, instead they are selected based on the exposure status of the individual. Thus, some participants might have the exposure and others do not have the exposure at the time of initiation the program, hence they are then followed overtime to evaluate for the occurrence of the outcome of interest (Setia, 2016). This design involves the use of longitudinal nature of the data that some of the variables in the data are time varying and some may be time independent. The main outcomes of the study-number of secondary schools and student enrollment were measured in retrospective method in which the impact of the program is evaluated after program implementation. Based on the data, the study covered 1459 wards where 263 wards were control wards and 1196 wards were treatment wards. To get a minimum

sample size which could help to detect the program impact, a statistical power calculation was done using STATA version 15 computer software to compute a minimum sample size which is sufficient to detect the program impact with statistical assumptions: common standard deviation ( $\sigma$ ) = 1, minimum detectable effect = 0.25, level of significance ( $\alpha$ ) = 0.05, CI = 95%. At  $\alpha = 0.05$  implying that I am 95% confident to conclude that the program has a causal effect on the outcome variables. Therefore, the statistical power calculation resulted that, a minimum sample size of 506 wards or more is sufficient and helpful to detect the impact of the program with a power of 80%. Meaning that the study has 80% chance of the test having significant results.

*Whereas treatment wards indicates wards that have received public secondary schools after 2004 and control wards indicates wards that did not receive public secondary schools after 2004.*

*\*\*\*Treatment wards = Treatment group*

*\*\*\*Control wards = Control group*

### **Difference in Difference (DID) Multiple Regression Model**

In order to evaluate the impact of SEDP program on outcome variables (number of secondary schools, and student enrollment), DID multiple regression model was employed. DID takes the difference in before-and-after outcomes in the treatment group (*First difference*), this difference controls for the factors that are time-invariant in that group, since we are comparing similar group to itself and other time-varying factors in the treatment group. Thus, to capture these time-varying factors, we take the difference before-and-after outcome for the control group, which was also exposed to the similar environmental condition as like on treatment group (*Second difference*). Finally, we obtain the difference-in-differences in the outcome of interest that “cleans” all time-varying factors from the first difference by subtracting the second difference from it and generating an impact of the program on outcomes “*DID estimator*”. Thus, DID method does as it is name suggest as it combines two estimates of the counterfactual which are before and after comparisons and comparisons between the treatment group and control group to obtain a good estimate of the counterfactual (World Bank, 2021). Further, DID estimate is also known as the average treatment effect (ATE) as it measures the impact of the program on the average outcome  $y$  with two groups, treatment, and control group with two time periods before-and-after as described below;

$$DID = (\bar{Y}_{s=\text{Treatment}, t=\text{After}} - \bar{Y}_{s=\text{Treatment}, t=\text{Before}}) - (\bar{Y}_{s=\text{Control}, t=\text{After}} - \bar{Y}_{s=\text{Control}, t=\text{Before}})$$

where  $\bar{Y}$  indicates the average outcome, S indicates groups either treatment or control group and t indicates the time with before-and-after the program. Thus, to construct the DID estimate, we first calculate the difference in averages between treatment and control groups in each period then the difference in the result obtained over time. Second, we calculate the changes in averages for each of the treatment and control groups over time and finally difference these changes, hence DID estimate of the treatment effect is attained. However, this computation does not say anything about the significance of the DID estimator hence regression analysis is used. Therefore, DID multiple regression model is implemented as a dummy variable with interaction between time (after) and treatment group as described below;

$$Y_i = \beta_0 + \beta_1 \text{After} + \beta_2 \text{Treatment} + \beta_3 \text{After} * \text{Treatment} + \varepsilon$$

where  $Y_i$  indicates the outcome of interest per outcome variable  $i$ ; After is a dummy variable taking “1” after the program (SEDP) and “0” otherwise; Treatment indicates a dummy taking “1” if the ward received public secondary school after 2004 and “0” if the ward has not received public secondary school after 2004; and  $\varepsilon$  indicates the unobserved time-variant characteristics.  $\beta_0$  is an intercept,  $\beta_1$  represents the time trend common to the treated and controlled group,  $\beta_2$  represents treated group-specific effect (account for average differences between treated and controlled group) and  $\beta_3$  represents the true impact of the program (SEDP).

**Estimation of the Estimator of DID Multiple Regression Model**

$$E(Y_i | \text{After}, \text{Treatment}) = E(\beta_0 + \beta_1 \text{After} + \beta_2 \text{Treatment} + \beta_3 \text{After} * \text{Treatment} + \varepsilon)$$

$$E(Y_i | \text{After}, \text{Treatment}) = \beta_0 + \beta_1 \text{After} + \beta_2 \text{Treatment} + \beta_3 \text{After} * \text{Treatment}$$

But,  $E(\varepsilon | \text{After}, \text{Treatment}) = 0$  (Zero conditional mean assumption regression)

$$\text{Thus, } E(Y | \text{After}, \text{Treatment}) = \beta_0 + \beta_1 \text{After} + \beta_2 \text{Treatment} + \beta_3 \text{After} * \text{Treatment}$$

$$E(Y | \text{After} = 0, \text{Treatment} = 0) = \beta_0 \dots \dots \dots \text{Equation 1}$$

$$E(Y | \text{After} = 1, \text{Treatment} = 0) = \beta_0 + \beta_1 \dots \dots \dots \text{Equation 2}$$

By subtracting **Equation 1** from **Equation 2** above we get

$$E(Y | \text{After} = 1, \text{Treatment} = 0) - E(Y | \text{After} = 0, \text{Treatment} = 0) = \beta_0 + \beta_1 - \beta_0 = \beta_1 \text{Equation 3}$$

$$\text{Also, } E(Y | \text{After} = 0, \text{Treatment} = 1) = \beta_0 + \beta_2 \dots \dots \dots \text{Equation 4}$$

Then, by subtracting **Equation 1** from **Equation 4** above we get

$$E(Y | \text{After} = 0, \text{Treatment} = 1) - E(Y | \text{After} = 0, \text{Treatment} = 0) = \beta_0 + \beta_2 - \beta_0 = \beta_2$$

$$\text{Similarly, } E(Y | \text{After} = 1, \text{Treatment} = 1) = \beta_0 + \beta_1 + \beta_2 + \beta_3 \dots \dots \dots \text{Equation 5}$$

Then, subtracting **Equation 4** from **Equation 5** above we get

$$E(Y | \text{After} = 1, \text{Treatment} = 1) - E(Y | \text{After} = 0, \text{Treatment} = 1) = (\beta_0 + \beta_1 + \beta_2 + \beta_3) - (\beta_0 + \beta_2) = \beta_1 + \beta_3 \dots \dots \dots \text{Equation 6}$$

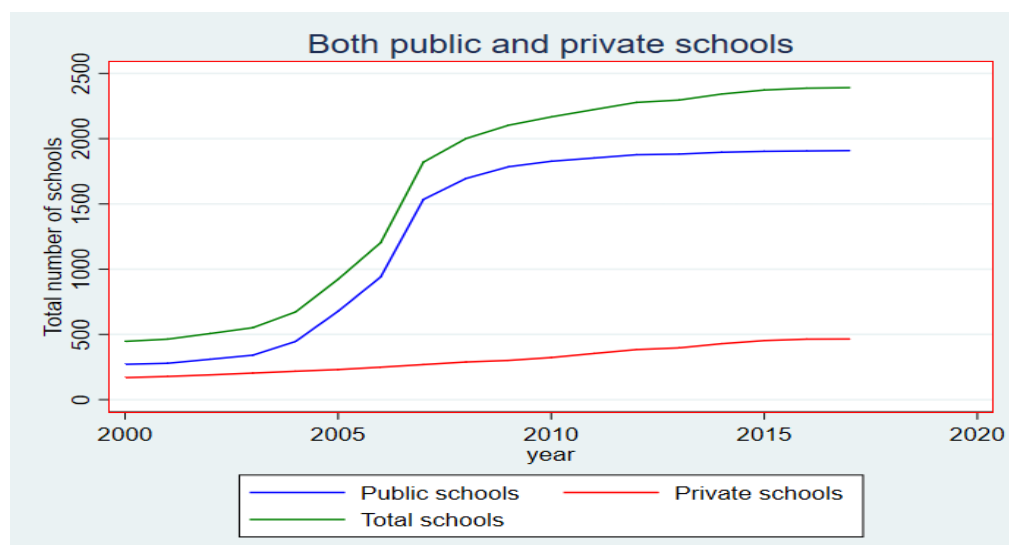
Finally, we obtain the DID estimator by subtracting **Equation 3** from **Equation 6**

$$\beta_1 + \beta_3 - \beta_1 = \beta_3 \text{ (DID estimator)}$$

## RESULTS AND DISCUSSIONS

### Line plots showing the trend of the total number of secondary schools.

The trend covered both public secondary schools that are owned by the government and private secondary schools that are owned by private individuals in Tanzania. Therefore, figure 1 indicated that, the total number of secondary schools in Tanzania had almost flat movement between 2000 and 2003. From 2004 public secondary schools were trending up by showing a steep slope movement while private secondary schools tend to have gentle slope movement. The steep slope movement showed by the trend of total public secondary schools suggests that, in 2004 there is an instrument that influence that steep slope. But one of the reason for that steep slope movement indicated by public schools was due to the introduction of the SEDP program, initiated by the government to expand access to secondary education in Tanzania. Furthermore, the trend of public secondary schools were keeping in increasing up to 2007 and become almost flat from 2010 to 2015.



**Figure 1: Trends of the total number of secondary schools in Tanzania**

### Impact of SEDP on the number of secondary schools

**Table 1: Impact of SEDP on the number of secondary schools**

Number of secondary schools	Coef.	St. Err.	t-value	p-value	[95% Conf Interval]	Sig

After	0.337	0.020	16.50	0.000	0.297	0.376	***
Treatment	0.518	0.019	27.16	0.000	0.355	0.481	***
After*treatment	0.503	0.023	21.64	0.000	0.458	0.549	***
Constant	0.729	0.018	41.41	0.000	0.695	0.764	***
R-squared	0.177		Number of		21099		
			observations				
Prob > F	0.000						

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

The results in table 1 indicated that, the impact of SEDP on the number of secondary schools is positive and significant, since the variable of interaction (after\*treatment) from the regression model indicates a positive coefficient of 0.503 which was statistically significant different from zero at 1% significance level, because  $p\text{-value} < 1\%$  and the  $t\text{-value}$  21.64 was greater than the critical value of 1.96. The results revealed that, SEDP has resulted in an increase in access to secondary education as a result of increasing the number of secondary schools in Tanzania. Therefore, the results suggest that, the number of secondary schools increases more in wards that have received the SEDP program than it would have without the program intervention. The findings are related to the study by Urassa (2015) in Tanzania who found that, SEDP has played an important role to the number of secondary schools and improved access to secondary education in Tanzania. Additionally, a study conducted by Ngware et al., (2006) in Kenya showed similar results as this study. Therefore, an increase in number of secondary schools improved access to secondary education, that also makes the reduction in the cost of education due to the availability of schools. Further, by reducing the cost, availability of schools near to the community will encourage individuals to invest more in education by increasing the expected economic returns such as higher wages to individuals and higher GDP growth to the nation.

### Impact of SEDP on student enrollment

**Table 2: Impact of SEDP on student enrollment**

Student enrolment	Coef.	St. Err.	t-value	p-value	[95% Conf Interval]	Sig
After	3.024	5.222	0.58	0.563	-7.223 13.27	
Treatment	7.954	5.217	1.52	0.128	-2.283 18.19	
after*treatment	18.887	7.378	2.56	0.011	4.411 33.364	**

Constant                    37.916      3.692      10.27      0.000      30.671      45.161      \*\*\*

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R-squared	0.04	Number	of	1050
		observations		
Prob > F	0.000			

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\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

The shown in table 2 indicates that, the impact of SEDP on student enrollment is also positive and significant. The findings showed that, the coefficient of the variable of an interaction between after and treatment (after\*treatment) which is the coefficient of the true impact of SEDP was positive (18.887). The results revealed that, the number of students enrolled in secondary schools increases more compared to the time without SEDP. Thus the findings suggest that, SEDP had a causal effect on student enrollment in Tanzania. The findings are equivalent to Urassa (2015) in Tanzania and Kazianga (2019) in Burkina Faso who found that school construction interventions like SEDP increases the number of students enrolled in secondary schools. Hence, an increase in student enrollment in a nation will improve education attainments and helps to see faster economic growth. Futhermore, a country economy will become productive as the propotion of educated individuals increases, since educated individuals can more efficiently carry out tasks that require literacy and critical thinking.

## CONCLUSION

This study evaluated the impact of secondary education development program on access to secondary education in Tanzania. The DID multiple regression model was used to measure the impact of SEDP on the number of secondary schools and students enrollment as outcome variables. The findings revealed that, SEDP had a statistically significant effect on the number of secondary schools and student enrollment in Tanzania. Meaning that, SEDP had succeeded to improve access to secondary education by increasing the number of secondary schools which also leads to an increase in the number of students enrolled in secondary schools compared to the period before the program. With respect to the findings of the study, therefore the study recommended the following: Firstly, the Government of Tanzania through the Ministry of Education, Science and Technology should continue to establish different programs like SEDP that will help to improve access to secondary education by increasing the number of secondary schools to enable all primary school leavers with secondary school age to join secondary schools. Secondly, other studies can be conducted to evaluate the impact of SEDP on the

performance of secondary school students in Tanzania. Thirdly, since the study was conducted at the ward level, then it is recommended to conduct a similar study at the regional level to evaluate the impact of the program in the regional level in Tanzania. Finally, the study employed the DID multiple regression model to evaluate the impact of SEDP on the outcomes of interest, therefore it is recommended that other studies could employ the combination of Difference in Difference and Propensity Score Matching methods to evaluate the causal effect of such a program on the outcomes of interest.

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