# The Impact of Tertiary Education on Unemployment in Sierra Leone

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**Abstract**

This research paper explores the significant contribution tertiary education towards the unemployment rate considering the year 2000 to 2017 using descriptive statistics, regression analysis, unit root test, Johansen cointegration and the Vector error correction model in order to examine the impact of tertiary education towards on unemployment rate in Sierra Leone. The results from the multivariate linear regression show that, both Government expenditure on education and the labor force are statistically significant contributions despite of indirect relationship between the unemployment rates. The unit roots test results shows that the variables are stationary at first difference which leads to test the long run relationship between the variables using the Johansen cointegration test. Based on the results of the cointegration test, it proves that there is relationship existing between the variables and while the vector error correction model results revealed government expenditure on education has no effect on the unemployment rate.

**Key words**: Tertiary Education, Gross domestic product, Unemployment rate, Expenditure, Labor force, Sierra Leone.

## 1. Introduction

Unemployment has been defined as the ability of a person not being able to find a job though seeking employment and readily available to start work at any time (OECD, 2019). According to Aden (2017), unemployment on the other hand maybe caused by many factors such as age, skillfulness, physical energy, work abilities, level of education etc. Therefore considering education as the sole reason for unemployment can be misleading. According to Alemu, (2016), approximately 60% of Sierra Leonean youths were unemployed and the rate is the highest in the sub West African region. Sierra Leone was ranked 180 out of 187 and 179 out of 187 of the United Nations Human Development Index in 2012 and 2013 respectively (UNHDI, 2014). The unemployment situation in Sierra Leone is challenging with the average of 3.10% of unemployment rate from 2004 to 2016 (Villa, 2017). This is unconnected with the high illiteracy rate in Sierra Leone. Eggert et al. (2010) found that the improvement in the educational achievement through various training programs and encouraging the movement of people from less develop regions to prosperous ones is seen as a good policy tool in curbing unemployment. The unemployment of youth in Africa and Sierra Leone in particular can be attributed to high illiteracy, weak economy and policies. Therefore exploring a study of this nature has the potential to investigate the correlation between tertiary education and unemployment in Sierra Leone and maximize the future trend of employment potential for graduates in Sierra Leone.

The major advantages of educated workers among others over the centuries has been the lower unemployment risk, increase salary wages, higher stability in employment and upward income and occupation mobility (Mincer, 1991). The rationale for this is that as productivity level of human capital improve, so will the economy thus producing many more efficiently (Erdem and Tugcu, 2012).

Over the years, research has proven that tertiary education serves as firm insurance against unemployment regardless of the economic situation of the country (Aden, 2017; OECD, 2012; Mirică, 2014) and have had considerable effects on the outcome of labor market (Riddell and Song, 2011). The Sustainable Development Goal (SDG) number four focuses on ensuring that the globe enjoys an equitable and quality education regardless of race, social and economic background due to the fact that education is the backbone to sustainable development and a self-sufficient planet (OECD, 2017). In Sierra Leone, poverty reduction critically relies on job availability because it has been considered as a major sustainability stabilizer (Sierra Leone Labor Force Survey, 2014). Theoretical evidence shows that tertiary education is connected with high employment rate and same is true for none educated men and women (OECD 2011). Tertiary education has the ability to develop the human capital and improve the cumulative productivity of economies hence the essential relevance of tertiary education (Erdem and Tugcu, 2012). However, the present global economy makes the employment of all tertiary graduates in any country impossible due to less labor market to absorb these skilled graduates (Erdem and Tugcu, 2012). Scholars such as (Arrow, 1973 and Spens, 1974) believes that education serve as a tool to filter and select student because of it financial and moral implications (Lavrinovicha et al. 2015). They argue that the cost of education is high and that can be counterproductive in terms of future employment.

Not many studies have been conducted with the scope of investigating the link between tertiary education and unemployment especially in Sierra Leone. However, Erdem and Tugcu, (2012) in Turkey explored the links between higher education and unemployment, Mirică, (2014) in Romania investigated higher education as means of solving salvaging unemployment. He concluded that high school graduates should be encouraged to pursue higher education if there should be a reduction in unemployment in Romania. Lavrinovicha et al. (2015) in Lativia Europe investigated the influence of education on unemployment and income. Aden (2017) examined the impact of education on the unemployment trend in Canada. He concluded that individuals without any form of certificates are prone to unemployment as compared to those with certificate especially medicine certificate. Eggert et al. (2010) compared education, unemployment and migration to see their interactions and concluded that education and migration distort unemployment. Also, Mincer (1991) crosses checks the links between education and unemployment in the early 90s. While in Sierra Leone Alemu, (2016) investigated the unemployment challenges and well as opportunities facing the youths in the country.

In Sierra Leone, unemployment has been a challenge since independence in 1961 with the trend and gap still widening in the 21st century. However, very little research has been carried out to investigate the root of the Dutch disease in Sierra Leone. The rationale behind the study is to explore the relationship between tertiary education and unemployment in Sierra Leone with a case study of two Universities. Information upon which the research originates is from secondary data of these two universities graduation statistics. To close the long gap of links between education and unemployment in the Sierra Leone context, an in-depth investigation as to how much tertiary students graduate each year and the percent of those being employed.

Therefore the main aim of this study of is to examine the impact of tertiary education towards the unemployment rate in Sierra Leone using annually data from 2000 to 2017. In order to accomplish this study, the paper is been structured into sections: section one present the introduction of the study, section two discuss the data and methodology used, section three present the data and with discussions, while section four discuss the conclusion and recommendations of this studies.

## 2.0 Methodology

**2.1. Description of study area:** Sierra Leone is located on the west coast of Africa. The country has a total area of 71,740 square kilometers and share border with Guinea in the north-east and Liberia in south-east. In Sierra Leone there are three major universities which have greatly contributed the development of the country socially, economically and morally which are University of Sierra Leone, Njala University and University of Makeni.

The University of Sierra Leone comprises of Fourah Bay College (FBC), Institute of Public Administration and Management (IPAM) and the College of Medicine and Allied Health Sciences (COMAHS) which are all situated in the capital city of Sierra Leone, Freetown and while Njala University (NU) is situated in the South part of the country and it comprises of two main campuses which are Njala Campus and Bo Campus. Both this two campuses have students pursuing various fields of study.

The University of Makeni (UNIMAK) is a private university located in Makeni City, Northern Province of Sierra Leone. The university operates with two major campuses which host students offering different discipline of studies.

Moreover, these institutions offered certificate, diploma, undergraduate and postgraduate programs in different areas of specialization which have play vital role in the development of the country.

## 2.2 Methods of Data Analysis

This study focuses to examine the impact of education towards unemployment rate in Sierra Leone. A time series data from the year 2000 to 2017 was used for estimation. The unit test using ADF is used in order to check the stationarity of the variables and the econometrics test also applied. Descriptive statistics was also used to give brief descriptions of the variables. The percentage unemployment rate was used as dependent variable and while percentage government expenditure on education, percentage Gross Domestic Products, percentage Labor force are used as independent variables.

**2.3. Source of Data:** The data were collected from World Bank (https://data.worldbank.org/), International Labor Organization (https://www.ilo.org/). The percentage government expenditure on education, Labor force, Gross domestic product and the Unemployment rate from the year 2000 to 2017 data was used for the analysis of this research work.

## 2.4. Specification of the model

$$UR = \beta_0 + \beta_1 GE + \beta_2 GDP + \beta_3 LF + \mu$$

Where UR= Unemployment rate (%), GE = Government expenditure on education (%), GDP = Gross domestic product (%), LF = Labor force (%) and $\mu$ = Error term

## 3. Result and discussions

## 3.1. Brief Descriptive Statistics of the variables

This section briefly present some descriptive statistics of the variables which are consider for this research paper in which the mean, median, maximum, minimum and the standard deviation values of the Government expenditure on education, Gross domestic products, Labor force and the unemployment rate in percentages were taking into consideration**.**

**Table 1. Summary descriptive statistics**

|            | GE (%) | GDP (%) | LF (%)  | UR (%) |
|------------|--------|---------|---------|--------|
| Mean       | 3.0955 | 2.6466  | 62.8385 | 4.0333 |
| Median     | 2.8850 | 2.4800  | 63.3570 | 4.0500 |
| Maximum    | 4.9500 | 5.0100  | 67.0470 | 4.7000 |
| Minimum    | 2.3800 | 0.9400  | 58.7160 | 3.4000 |
| Std. Dev.  | 0.6977 | 1.3113  | 2.9859  | 0.5144 |
| Observations | 18   | 18      | 18      | 18     |

**Source: World Bank and IMF (2000-2017)**

The table above is a summary of the descriptive statistics of the government expenditure on education, gross domestic product, labor force and the unemployment rate. The average government expenditure on education, gross domestic product and the unemployment rate is approximately two, six and four percent. The standard deviation of labor force recorded the highest as compare to the values of the gross domestic product, unemployment rate and the government expenditure on education.

However the coefficient of variation is not much large no large variability detected within the variables. The average percentage labor force of the country is 63% which is higher than the expenditure of government towards the education, the economic growth which is measure in GDP and the unemployment rate.

**Figure 1: Unemployment rate in Sierra Leone (2000-2017)**



UNEMPLOYMENT(%)
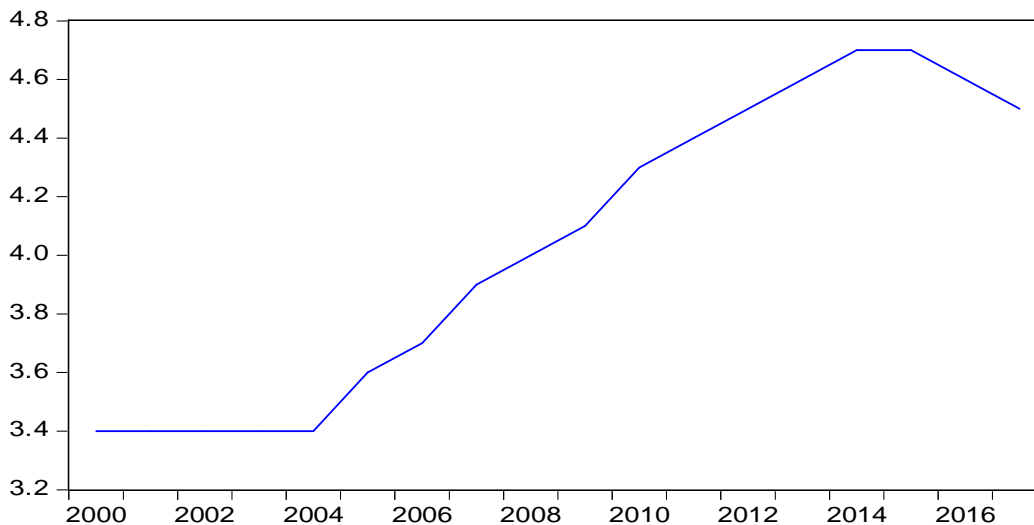
Unemployment has been a serious challenge for most countries across the world. In Sierra Leone, the unemployment rate has been increased over the years (see figure 1). There is much increase in the year 2004 to 2016 as this can be attributed to the large amount of graduates from tertiary institutions without job opportunities. Also, the growing population of the country has also affected the unemployment rate as there are not adequate jobs in the country as a whole. As a result of this,

the economic and development of the country will be affected greatly despite of government and other development organizations effort to reduce the unemployment rate especially graduate students from tertiary institution that have already acquired the necessary knowledge and skills.

**Figure 3. Expenditure on Education (2000-2017)**
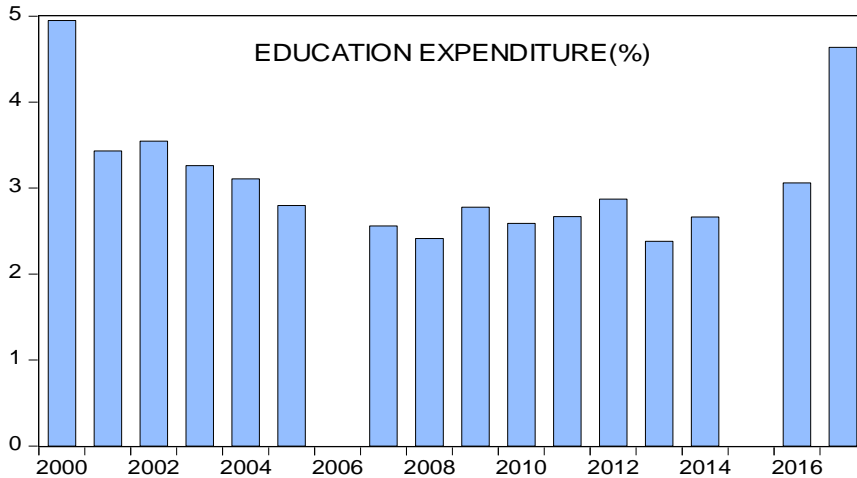


The figure above shows the government expenditure on education in percentage (%) from 2000 to 20016. The result as shown in the figure above indicate that there is high government expenditure in the 2000 and 2016. Much more spent in the year 2000 because of government effort to improve the educational system after the civil war in the country. In 2015, the country suffered the epidemic diseases called Ebola, which really cause government to close all government institutions as a result of this no government expenditure on education.

**Figure 2. Labor Force (2000-2017)**
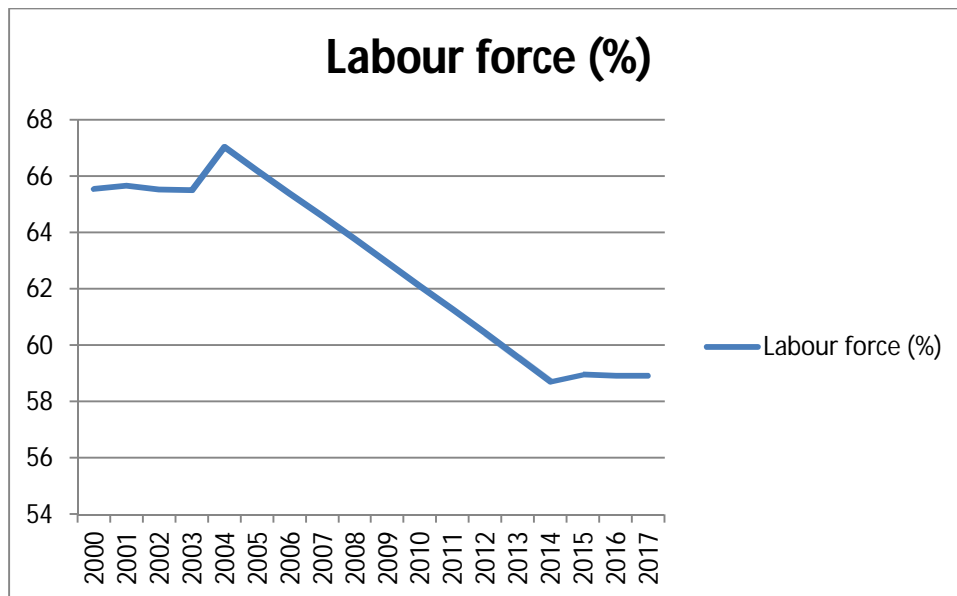
According to the International Labor Organization (ILO) definition, labor force is described as the sum of persons in employment plus persons in unemployment.

As shown in figure 3 above, there is an increase and a decrease of the percentage of the labor force from the year 2000 to 2004, while it drastically fall down from 2005 to 2017 which indicate the employment rate is challenging as result of several factors like more graduate students from tertiary institutions with different disciplines with inadequate employment facilities.

## 3.2. Regression

**Table 2. Multivariate Linear Regression analysis of the independent variables (Education expenditure, GDP, Labor force) and unemployment rate (2000- 2017)**

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| c | 13.99245 | 2.269525 | 6.165366 | 0.0001 |
| Education Expenditure | -0.130736 | 0.047800 | -2.735036 | 0.0194 |
| GDP | 0.021437 | 0.074231 | 0.288783 | 0.7781 |
| Labor Force | -0.153114 | 0.031521 | -4.857557 | 0.0005 |

| | | | |
|---|---|---|---|
| R-squared | 0.971847 | Mean dependent var | 3.986667 |
| Adjusted R-squared | 0.964169 | S.D. dependent var | 0.519432 |
| S.E. of regression | 0.098324 | Akaike info criterion | -1.577914 |
| Sum squared resid | 0.106344 | Schwarz criterion | -1.389101 |
| Log likelihood | 15.83436 | Hannan-Quinn criter. | -1.579925 |
| F-statistic | 126.5729 | Durbin-Watson stat | 1.321798 |
| Prob(F-statistic) | 0.000000 | | |

**Source: World Bank**

Model: $UR = \beta_0 + \beta_1 GE + \beta_2 GDP + \beta_3 LF + \mu$

According to the regression results in table 2 above, the final regression model is obtained as:

UR= 13.99245 - 0.130736 GE + 0.021437 GDP - 0.153114 LF

From the table above, the result shows that there is a negative relationship between the unemployment rate and the expenditure on education.

Generally, the regression coefficient for β1 shows that a unit increase in higher education expenditure per capita will lead to about 13.07% decrease in the unemployment rate. The p-value of 0.0194 statistically significant at the five percent (5%) significant level and therefore, expenditure on education does help predict the length of unemployment in this model.

The R-Squared value is also very important statistic parameter to evaluate. In this case, the R-squared is 0.97. This value indicates that 97% of the variance in the unemployment rate can be explained by the expenditure on the education

**3.3. Unit root test**: This test is used to check the order of integration on the variables for their stationarity order using the Augmented Dickey- Fuller (ADF) test statistics.

**Table 3. Augmented Dickey- Fuller (ADF) Unit Root Test**

| Variables | ADF- Test statistics | Critical values (5%) | Integration order |
|---|---|---|---|
| UR | -1.572611 | -3.065585 | I (1) |
| GE | -3.548736 | -2.984991 | I (1) |
| GDP | -3.653030 | -3.081002 | I (1) |
| LF | -2.813416 | 0.0785 | I (1) |

From table 1 above, it indicate that some variables are stationary at first difference since their critical values at 5% are greater than the ADF-Test Statistics. Hence the order of integration is one; therefore we can use the Cointegration test and the Error correction model in order to test for the long run relationship between the dependent variable and independent variables.

**3.4. Jonhansen Cointegration Test**

This test is used to show whether there will be a long run relationship among the dependent variable and the independent variables. The long run relationship can be determined through Trace and Max-Eigen Statistic values.

**Table 4. Jonhansen Cointegration Test**

| Hypothesized No. of CE(s) | Eigenvalue | Trace Statistic | 0.05 Critical value | Prob.** |
|---|---|---|---|---|
| None * | 0.947776 | 75.19850 | 47.85613 | 0.0000 |
| At most 1 | 0.548737 | 27.96310 | 29.79707 | 0.0802 |
| At most 2 | 0.454572 | 15.23182 | 15.49471 | 0.0547 |
| At most 3 * | 0.292349 | 5.532862 | 3.841466 | 0.0187 |
| Hypothesized No. of CE(s) | Eigenvalue | Max-Eigen Statistic | 0.05 Critical value | Prob.** |
| None * | 0.947776 | 47.23540 | 27.58434 | 0.0001 |
| At most 1 | 0.548737 | 12.73128 | 21.13162 | 0.4773 |
| At most 2 | 0.454572 | 9.698957 | 14.26460 | 0.2325 |
| At most 3 * | 0.292349 | 5.532862 | 3.841466 | 0.0187 |

It can be observed that there will be a long-run affiliation existing among the variables as the Trace and Max-Eigen statistic shows that there are at most two co-integrated relationship in the long run

and while also their  trace statistic values is greater than the critical values at 5% significant level (figure 2).

It can be observed that in long-run GDP, Labour force and the Government expenditure on education; will have a significant effect on the unemployment rate in Sierra Leone.

### 3.5. Vector Error Correction Model

Since Jonhansen cointegration test results above shows that there is a cointegration between the variables, then we can applied the vector error correction model in order to identify if there is effects between the variables.

### Table 5. Vector Error Correction Model Results

|          | Coefficient | Std. Error | t-Statistic | Prob. |
|----------|-------------|------------|-------------|-------|
| C(1)     | 0.382495    | 0.264844   | 1.444232    | 0.1793 |
| C(2)     | 0.527137    | 0.357080   | 1.476242    | 0.1707 |
| C(3)     | 0.046974    | 0.045008   | 1.043672    | 0.3212 |
| C(4)     | 0.133274    | 0.052572   | 2.535073    | 0.0296 |
| C(5)     | 0.072157    | 0.040936   | 1.762665    | 0.1084 |
| C(6)     | 0.040883    | 0.024670   | 1.657229    | 0.1285 |

| | | | |
|----------|-------------|-----------------------|-----------|
| R-squared          | 0.649074  | Mean dependent var    | 0.068750  |
| Adjusted R-squared | 0.473611  | S.D. dependent var    | 0.094648  |
| S.E. of regression | 0.068670  | Akaike info criterion | -2.239012 |
| Sum squared resid  | 0.047156  | Schwarz criterion     | -1.949291 |
| Log likelihood     | 23.91210  | Hannan-Quinn criter.  | -2.224176 |
| F-statistic        | 3.699204  | Durbin-Watson stat    | 2.056609  |
| Prob(F-statistic)  | 0.037224  |                       |           |

In order to investigate if government expenditure on education, gross domestic products and the labour force have effect on the unemployment rate of the country then the p-value  of C(1) should be significant and with a negative value coefficient of C(1).

As seen in table 5, the p-value of C (1) is not significant since it greater than 5% level of significance and also the coefficient value of C(1) is not negative. Therefore we can conclude that the government expenditure on education, GDP and the labour force did not have effect on the unemployment rate.

### 4. Conclusion

This study investigates the impact of tertiary education towards unemployment rate in Sierra Leone by using annual data from the period of 2000-2017. The regression model, unit root test, Johansen cointegration test, and vector error correction model were applied in order analyse and draw conclusions based on the results obtained.

The result from the multivariate linear regression shows negative but significant effect of government expenditure on education towards the unemployment rate of the country. Since the result of the unit root test proves that some of the variables are stationary at first difference, then

Johansen cointegration approach results confirm that there is a long run relationship between the variables.

The result from the vector error correction model shows that government expenditure on education does not have any effects towards reducing the unemployment rate in the country.

Tertiary education plays a crucial role in the development of any country as it helps to boost the economic growth of the country, therefore government should ensure that more resources should be invested in tertiary education. Generally, the results has proven that expenditure on education has not much have effect in reducing the unemployment rate of the country, therefore this research paper recommend both the government, universities authorities and developing partners to design and implement good tertiary programmes of study that are in line with job markets as this will help to increase the employment rate in the country. Moreover contribution of the Gross domestic product has insignificant contribution towards the unemployment rate due to an increase in the unemployment rate.

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