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Original Article

Human Capital, Gender Inequality and Economic Growth in Nigeria: ARDL-Bound Test Approach

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Abstract: *There appears not to be an imminent annihilation in the aged-long belief that men and women are not equal. Gender inequality does seem to gain wide popularity and practice in most African societies, particularly even in the current era of increased civilization, technological advancement and educational exposure in Nigeria. Despite its inherent part in African culture, gender inequality could hypothetically impede a country's success possibility in its strive for economic advancement. This study analyzes time series data covering 38 years from 1981-2018. We investigate how gender inequality and human capital impact the pace and direction of growth of the Nigerian economy. The study adopts the Auto Regressive Distributed Lag (ARDL) bound test for the cointegration approach. The result of the unit root test that was conducted using the ADF test reveals that all variables are integrated at the order I(1) except for GCF, which is integrated at order I(0). The error correction model was estimated once the long-term relationships between the variables were established. Male labour participation, female labour participation and government expenditure on education have a positive impact on per capita GDP. By implication, the more male and female labour participate in economic activities, per capita GDP would increase. This impact also goes along with that of government expenditure on education. The study further recommends an improvement in spending on the educational sector. The quality and skill of the labour force will lead to improved per capita GDP in the long run.*

Keywords: *Gender Inequality, Human Capital, Co-Integration, Economic Growth.*

I. INTRODUCTION

The apparent upswing in the trend of gender inequality in most developing societies, especially in African countries, since many decades ago is now having negative effects on their politics, society and economies; this includes political instability and female or gender imbalances, unhappy society, crime, investment opportunities, low productivity, skills imbalances as well as wealth distribution. To reduce the aforementioned effects, the role of human capital through investment in education, health and training is are important instrument, especially in the 21st century (World Bank 2009). Moreover, Liaamba, Dzator and Zhang (2015) and ways to reduce the trends in the inequalities.

The measurement of the economic performance of any nation using various measurements and variables, which include human capital, should not be seen independently but must also include its even distribution of resources, income, jobs and political offices. In an attempt to achieve an unparalleled macroeconomic performance in most especially African nations, equity must be maintained in the distribution of human capital. This, apart from the economic achievement will also bring about push the society toward an egalitarian state. Human capital plays an important role in income distribution and as well an important factor influencing income inequality (Egbelore and Eleonu, 2018). The work of Fields (1980); and Chakraborty and Das (2005) confirmed that when there is equity in the sharing of human capital resources, it brings about a balance also in the income of the economy. If there is a rise in inequality among the people, there will be a level of imbalance in income distribution, as opined by (Maryna and Tiiu, 2016).

However, studies on the allotment of resources that pertained to human capital and income have shown incongruous outcomes involving the direction of adjustment of in inequality of human capital as it relates to that of income as entrenched in the literature (Ahang, 2014). Ram (1990), Park (1996) and Gregorio and Lee (2002) applied the method of the standard deviation of educational resources as a gauge for human capital inequality level. Also, income distribution stands for income inequality. They agreed that when variation in human capital resources is high, it stimulates the disparity level in the income as well.

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Inequality in income level is where there is an unbalanced allotment of the entire national earnings among the entire domestic unit in the country. It is a measurement of the proportional income gap between the lowest and highest-paid earners among the people who make up the country's population. It also could be seen as a tool for measuring the gap existing in income earning among individuals in the country (Oluwatayo, 2008). The existence of dissimilarity in income influences the workings of the economy. This impacts the achievement of some developmental objectives. Compared to industrialized economies, the detrimental effects of inequality are more noticeable in economically challenged nations (Anyalebechi, 2016). The effects of inequality include a stumpy rate of even resource circulation. This produces another adverse consequence that is related to poor quality of living, starvation, illiteracy and gender imbalance.

Meanwhile, the characteristics of soaring dissimilarity in resource allocation include stumpy quality of knowledge and skill development and inefficient market outcomes. The policy makers of most less developed economies in a couple of decades past have made gender disparity a focal problem to be addressed in employment in virtually all sectors of the economy. According to the findings of the World Development Report (2012), the employment nature of men is quite different from those that are set aside for women. This cuts athwart segments, production lines, professions, types of jobs, or production outlays.

The concept of gender-equal opportunity has to do with indifferent privileges instituted across genders, responsibilities and prospects that all individuals ought to benefit from, without necessarily considering whether such an individual is a man or woman. Disparity in gender treatment and benefits does not necessarily connote that all women are treated badly compared with their male counterparts; rather, it suggests discriminatory dealings or views of folks pedestal of their masculinity or feminism. The begins from incongruity placed on this class of individual by their social environment as well as biological makeup. Gender inequalities have appeared to be openly discussed and debated largely in the male-stream political economy, but the issue of gender inequality in human capital development and inequality in paid work, which mitigates income inequality and income distribution, has not been properly addressed. The question now is whether the growth in female employment has had an equalizing or asymmetrical effect on income distribution.

The impact of women's employment on income inequality depends on the number of female-qualified people seeking employment, which is the product of the level of education, health status, training, age, culture, marriage status and, to some level, the issue of religious (Aderounmu and Soetan, 2013).In addition, the issue of gender employment distribution and discrimination in African countries, which brings out high-income inequality, is the political terrain where men domination on the elective and selective political positions (Adams and Olajumoke, 2016). The elective positions are characterized by monetary influence and godfather's syndrome, which women lack. The issue of regional selection of political posts and women's attitudes is to unite together to speak with one voice in the election and selection of political posts in different African countries.

Undoubtedly, notable achievements have been made in the African countries through the involvement of the private sector in the establishment of primary, secondary and higher institutions. Nevertheless, they have still been faced with salient confrontations in a bid to mitigate the social scourge of inequality in learning and skill development in order to achieve and maintain high-skill personnel across gender and promote economic growth. Reasons for inequalities in human capital and gender inequalities in African countries include the issue of culture. Because the training of girl child in this part of the world is considered as dissipation and a waste of resources, it is in the idea that male children bear the parental name and carry the family identity to the next generation, unlike the girl child. Provisions for parents, when they are older were also the premises upon which male children are preferred and given more priority than girls owing to the fact that they will be married away to become part of other families (Schultz 2002).

Finally, according to Anyalebechi (2016), human capital choices of individuals and families affect the composition and supply of the labour force or the human capital, which eventually affects income inequality and gender imbalances. The choice of type of human capital in which to invest will include whether to invest in skilled or unskilled, whether to attend college or higher institutions. It also includes the type of skill or much human capital to acquire and the price of the skill in the labor market, how intensively their skills will be applied to the market sector and finally, enough hours for family care or maintenance. All these affect the choices of individuals in skilled or unskilled which affects income equality or inequality as well as gender equality.

II. REVIEW OF LITERATURES

Egbulore and Eleonu (2018) identified factors that determine female contribution to growth. Secondary data was used while the OLS method was adopted to process the data. The findings showed that the enrollment of boys in school and the rate of employment of women determine the pace of growth in the economy. The study therefore, recommended that the government should take gender equality and gender structural transformation seriously for the country to achieve sustainable growth. It also advised the government to invest more in policies that would boost education standards, create employment as well as remove everything that creates barriers to gender access to education and employment in Nigeria. In their contribution to gender income inequality kinds of literature, Aderounmu and Soetan (2013) examined the determinants of gender income inequality in sub-Saharan African Countries; they examined several causal factors of the gender wage gap in sub-Saharan African countries. The study utilized an approach based on quantitative analysis to gather data from seven different countries. The data was then analyzed using a panel-fixed regression model and the random impact estimate method. Their research revealed that government spending, population growth, tertiary education, and female income disparities were all highly correlated.

The subject that pertains to disparities in wage earnings across men and women in the human capital framework attracted the interest of Maryna and Tiiu (2016). The paper agreed that regardless of the rising harmonization of male and female human capital attainment, the wider gap still remains. Primary data were gathered from the investigation of adult skills, and respondents were assessed based on sex, background characteristics, educational attainment, cognitive skills and labour market profiles. The results of the findings showed that wages for high skills are extremely high, and despite worse educational attainments, the male-specific is associated with higher earnings than the female-specific profile.

Liamba, Dzafor and Zhang (2015) examined the impact of gender parity in education on economic performance. Panel data from five Southern African countries for forty years (1970-2010) was used. Instrumental Variable technique was employed to process the data. Their result findings showed that gender fairness in education goes in the same direction of increase with growth in the economy of the area studied. Also, it was found that fertility as a variable has an inverse relationship with growth.

Furthermore, the level of democratic practice has a direct impact on gender egalitarianism in education. Human capital measurement (indicated by enrolment in primary school) is not significant over the long –term. The study suggested a realistic policy to develop a strategy that would offer a venue for men and women to have equal access to excellent educational opportunities and training.

Furthermore, Polachek and Xiang (2014) examined cross-country differences in the gender pay gap with more focus on the impact of labour market institutions that are related to female lifetime work. The study employed an international social survey programme (ISSP) and Luxembourg income study (LIS) together with OECD pay statistics spanning 33 years (1970-2002) and 35 countries. The findings demonstrated that while female educational attainment is adversely correlated with gender gap pay, the fertility rate, the difference between husband and wife at the time of their initial marriage, and the highest rate of marginal income tax are all favorably correlated to the gender gap. The study evidently shows that the gender pay gap affects women's lifetime labour force participation. Finally, collective bargaining is negatively associated with the gender pay gap.

The comparison between male and female counterparts in getting decent jobs in Nigeria was the focus of Oloni, Afolabi, Agba and Ogunjobi (2016) in their study on gender inequalities in decent employment agenda in Nigeria. The objective of the study is to investigate the problem of gender inequality in decent employment including political and academic environment. A survey of six Universities and the National Assembly was conducted, and data was tabulated using multiple bar graphs to analyze their findings. The findings reveal that women are marginalized in most decent employment, both in formal and informal sectors of the economy. It asserted that women were majorly limited to trading and farming. Accordingly, the study suggested that the government should put more emphasis on educating women and supporting them for political office in the nation.

Ahang (2014) examined the effect of gender disparity on industrialized nations' economic expansion. The study looked at how gender disparities in education and health contribute to higher levels of human capital, overall welfare, and health. The study used panel data (from 2006 to 2012) and employed Pooled EGLS (Cross-section weights) to process its data. The study's findings showed that while women's human capital has a favorable impact on growth, the social capital index has an adverse effect on economic expansion.

Jordan (2017) examined the relationship between human capital and income inequality in the OECD from 1985 to 2008. The objective of the study is to examine the role of human capital in the growing inequality among the OECD. Panel data were gathered, and the data were processed using multiple regression analysis. He used the gini coefficient to quantify economic disparity and the average educational attainment to measure human capital. The data indicated a negative correlation between economic disparity and human capital. The study thus implored the countries to put more effort into human capital because of its significant role in reducing the growing income inequalities in the member countries.

The objective of the study is to analyze the effect of Human capital and Gender inequality on economic growth in Nigeria using the ARDL Bound-Testing approach. Having identified the gaps in the literature on gender inequality, human capital and economic growth, Adams and Olajumoke (2016) examined gender equality and the empowerment of women in Nigeria. The adopted primary data while correlation analysis and descriptive statistics were used. The results of the finding show that the misuse of culture, religion and traditional practices, which allow educational, political and social power to be dominated by men and allow women to be their followers, should be discouraged. The study, therefore, suggested strategies to ensure gender equality in all sectors in Nigeria.

Also, Junyoung, Jong-Wha and Kioanulo (2016) examined a model of gender disparity and economic growth that takes into account how much time women spend on raising their children, producing goods for the market, producing at home, and educating them. The model was calibrated by examining the relationship between several dimensions of gender disparity and the economy's growth performance using micro-level data. In addition to the studies on gender inequality, Anyalebchi (2016) emphasized more on the issue of gender inequality in Nigeria.

III. THEORETICAL FRAMEWORK AND METHODOLOGY

As earlier stated, the study's main objective is to examine the effect of Human capital and Gender inequality on economic growth in Nigeria. To achieve this objective, the study adopts the endogenous growth model which assumes technological progress to be an important factor for long-run economic growth. The endogenous growth model postulates that, as human capital improves, it boosts economic growth and development in the same direction. The endogenous model is an expansion of the neoclassical growth model, which assumes that growth is induced by savings, capital accumulation and technical progress, which lead to efficiency.

Annual statistical data spanning 38 years (1981-2018) from the World Bank World Development Indicators (WDI) are used in this study. The selected variable includes the Gross Domestic Product Per Capita (GDPPC) is used to proxy economic growth. Gross Capital Formation (GCF), Male Labour Participation (MLP)and Female Labour Participation (FLP) are used to proxy gender equality, Government Expenditure on Education (GEE) and Government Expenditure on Health (GEH) measured by human capital.

Table 1: Data Description and Measurement

Data	Symbol	Data Source	Measurement
Gross Domestic Product Per Capita	GDPPC	World Development Indicators (2020)	Constant Naira
Gross Capital Formation	GCF	World Development Indicators (2020)	Naira
Male Labour Participation	MLP	World Development Indicators (2020)	Percentage
Female Labour Participation	FLP	World Development Indicators (2020)	Percentage
Government Expenditure on Education	GEE	World Development Indicators (2020)	Naira
Government Expenditure on Health	GEH	World Development Indicators (2020)	Naira

Source: *Authors*

A) Model Specification

The model used in this study follows the specification by Cooray et al. (2014)with slight modifications made to suit this research work objective.

The model used is specified in its implicit form in Equation 1:

$GDPPC = f(GCF, MLP, FLP, GEE, GEH)(1)$

Equation 2 is expressed as an explicit function

$GDPPC_t = \propto + \beta_1 GCF_t + \beta_2 MLP_t + \beta_3 FLP_t + \beta_4 GEE_t + \beta_5 GEH_t + \mu_t (2)$

Where:

$GDPPC_t$= Gross Domestic Product Per Capita, GCF_t = Gross Capital Formation, MLP_t = Male Labour Participation, FLP_t = Female Labour Participation, GEE_t= Government Expenditure on Education, GEH_t = Government expenditure on health, $\propto$ = Intercept, $\beta_1 - \beta_5$ =coefficient of the parameters and μ_t = error term.

The Auto Regressive Distributed Lag (ARDL) bound test for the cointegration approach by Pesaranet al. *(2001)* is adopted in this study, and this is because the ARDL method has some advantages over the older cointegration method of Engel-Granger and the Johannsen cointegration test, such as the assumption that it is more efficient when the variables are integrated at different orders. The ARDL method is also assumed to be more effective when dealing with small sample sizes. Insight of the ARDL model is drawn from (Popoola et al., 2018).

An ARDL *pq* model is formulated and presented in Equation 3while the error correction model is presented in Equation 4:

$$\Delta GDPPC_t = \propto_0 + \sum_{i=0}^{p} \beta_1 \Delta GDPPC_t + \sum_{i=0}^{q} \beta_2 \Delta GCF_t + \sum_{i=0}^{q} \beta_3 \Delta MLP_t + \sum_{i=0}^{q} \beta_4 \Delta FML_t + \sum_{i=0}^{q} \beta_5 \Delta GEE_t + \sum_{i=0}^{q} \beta_6 \Delta GEH_t + \gamma_1 GDPPC_t + \gamma_2 GCF_t + \gamma_3 MLP_t + \gamma_4 FML_t + \gamma_5 GEE_t + \gamma_6 GEH_t + \mu_t \quad (3)$$

$$\Delta GDPPC_t = \propto_0 + \sum_{i=0}^{p} \beta_1 \Delta GDPPC_t + \sum_{i=0}^{q} \beta_2 \Delta GCF_t + \sum_{i=0}^{q} \beta_3 \Delta MLP_t + \sum_{i=0}^{q} \beta_4 \Delta FML_t + \sum_{i=0}^{q} \beta_5 \Delta GEE_t + \sum_{i=0}^{q} \beta_6 \Delta GEH_t + \emptyset_1 ECM_t + \mu_t \quad (4)$$

From Equations 3 and 4, $\propto_0$ is the intercept,$\beta_1 - \beta_6$ are the short-run coefficients, $\gamma_1 - \gamma_6$is the long run coefficient, Δ is the change operator, and ECM_t is the error correction term.

IV. RESULTS

Table 1: Unit root Test

Variable	Level	1st difference	Decision	Remark	1%	5%	10%	Prob. Value
GDPPC	-1.4631	-3.4485^c	I(1)	ST	-4.235	-3.540	-3.202	0.061
GCF	-3.9023^b	-	I(0)	ST	-4.227	-3.537	-3.200	0.022
MLP	-0.5089	-3.5592^b	I(1)	S	-3.700	-2.976	-2.627	0.031
FLP	-1.8306	-3.5071^c	I(1)	ST	-4.356	-3.595	-3.234	0.060
GEE	-0.9863	-3.7874^b	I(1)	ST	-4.339	-3.588	-3.229	0.033
GEH	-0.9133	-4.2470^b	I(1)	ST	-4.324	-3.581	-3.225	0.012

$^{a, b}$ and ^{c} denote 1%, 5% and 10% level of significance, respectively.
S = Stationary with intercept. ST = Stationary with trend an intercept
Source: *Author's compilation*

It is essential to test for the stationarity of the variable used in this study. The unit root test was conducted using the Augmented Dicky-Fuller test for all variables in this study, and the results are presented in Table 1. The result from the Augmented Dickey-fuller test reveals that except for GCF, which is integrated at the order *I(0)*, all variables (GDPPC, MLP, FLP, GEE and GEH) are integrated at the order *I(1)*. GCF, MLP, GEE and GEH were stationary at the 5% level of significance, while GDPPC and FLP were stationary at the 10% level. This result informs our decision to make use of the Autoregressive Distributive Lag (ARDL) is used to examine the long-run relationship.

Table 2. ARDL Bound Testing for Cointegration

Significance level	*I(0)* Lower bound	*I(1)* Upper bound	F-Statistics	K
10%	2.08	3	8.375443	5
5%	2.39	3.38	8.375443	5
2.5%	2.7	3.73	8.375443	5
1%	3.06	4.15	8.375443	5

Source: *Author's compilation.*

The ARDL bounds test is used to determine if there is a long run relationship among the variables used in this study. Table 2 presents the result from the bound test cointegration results when GDPPC is the dependent variable. From Table 2, the f-statistic is 8.37544. this figure is greater than the value of the upper bound critical value of 3.00, 3.38, 3.73 and 4.15, respectively, for the 10%, 5%, 2.5% and 1% significance levels. Based on this output, the null hypothesis of no cointegration in the model is rejected.

Table 3. ARDL Result

Long run coefficients					
GCF	**MLP**	**FLP**	**GEE**	**GEH**	**C**
-7.57E-09	91.9973	119.5303	0.00081	-6.41E-05	-11189.34
(0.1730)	(0.0189^b)	(0.0052^c)	(0.0004^c)	(0.1800)	(0.0039^c)
[-1.42637]	[2.61150]	[3.23663]	[4.50597]	[-1.40214]	[-3.36391]

Short run coefficients					
ΔGDPPC(-1)	**ΔGDPPC(-2)**	**ΔGCF**	**ΔGEE**	**ΔGEE(-1)**	**ECM(-1)**
0.215873	0.500262	1.61E-09	7.54E-05	-0.000196	-0.413887
(0.0292[b])	(0.0001 [c])	(0.1550)	(0.0001 [c])	(0.0000 [c])	(0.0000 [c])
[2.39524]	[5.33906]	[1.49266]	[5.14141]	[-7.642303]	-8.978510
R-squared0.870695 Durbin-Watson stat.				2.347931	
[a, b & c] means statistically significant at 10%, 5% and 1%.					

Source: *Author's compilation*

Since the long-run relationship has been established among the variables, the error correction model is the estimate and the long-run and short-run coefficients from the ARDL model are presented in Table 3. The selected ARDL model is 3, 1, 0, 0, 2, 0. The long run estimate reveals MLP, FLP and GEE to be statistically significant. Both male and female labour participation have a positive relationship with per capita GDP. This means that the more male and female labour participate in economic activities, the per capita GDP will increase. This result is similar to that of government expenditure on education. This could mean that as more is spent on the educational sector, the quality and skill of the labour force will lead to improved per capita GDP in the long run.

From the short-run estimates, the error correction model is -0.413887, which is approximately 41.39%. This suggests that any error that occurs in the model in the previous period will be corrected in the present period at an adjustment speed of 41.39%. The ECM is statistically significant and has the expected negative sign. R2 indicates a good fit and the Durbin-Watson statistic of 2.3 also shows no problem of autocorrelation in the model.

B) Diagnostic Test

To give credence to the results obtained from the ARDL analysis, a few diagnostics tests are performed and are shown in Table 4. Some of the diagnostics tests conducted include the Breusch-Godfrey serial correlation, Heteroschedasticity and normality test. Other structural stability tests applied in this study include the cumulative sums of recursive residuals (CUSUM) and the cumulative sums of squares recursive residuals CUSUMQ.

From the results in Table 4, the probability values are all above 5%, indicating that the null hypothesis of no autocorrelation, no homoscedasticity in the residual and normally distributed residuals cannot be rejected.

CUSUM and CUSUM of the square are presented in Figures 1 and 2 and can be deduced from the figures that the plots lie within the 5% significant level. The model is, therefore, stable.

Table 4. Diagnostic results

Test	**F-statistic**	**Prob. Value**
Autocorrelation LM test	2.6029	0.2721
Heteroschedasticity	0.7809	0.6554
Jarque-Bera Normality test	0.6970	0.7057

Source: *Author's compilation*

Figure 1. Cumulative Sums of Recursive Residual (CUSUM)

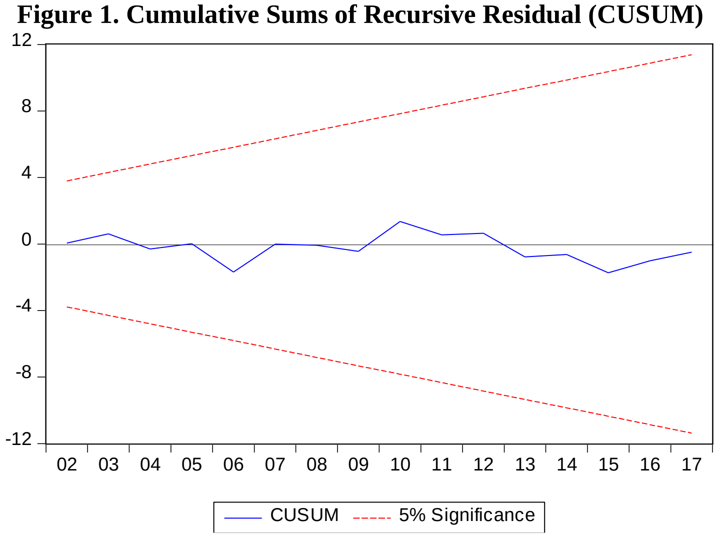
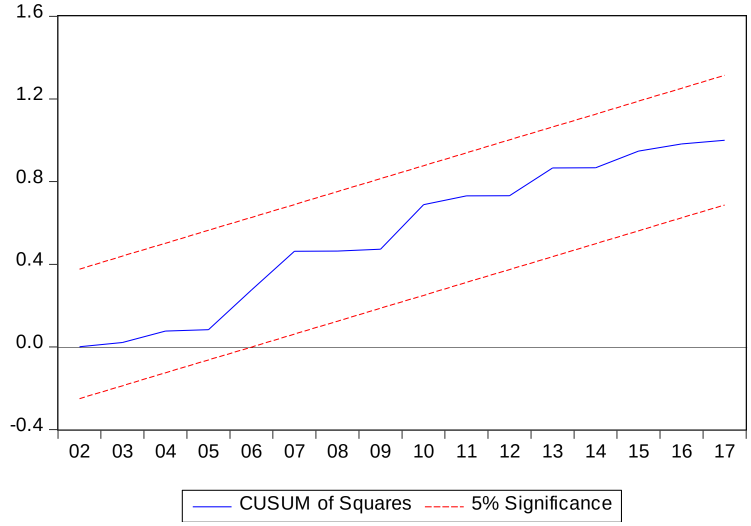


Figure 2. Cumulative sums of squares recursive residuals (CUSUMQ)



V. CONCLUSION AND RECOMMENDATIONS

Fostering gender equality will change the economic game. According to the IMF's (2018) most recent assessment of Nigeria's economy, reducing the gender gap will lead to increased productivity and growth as well as more stability. Gender studies researchers agree that, given the opportunity, Nigerian women could help change the economy. Newiak (2019) reveals that Nigeria is suffering from widespread gender inequality and thus lacks a key ingredient for economic success. Newiak (2019) says that reducing gender inequality could, on average, boost growth by one and a quarter per cent.

Since the agenda for women's rights in a democratic society has been discussed in public, individuals, academics, public analysts, and the larger international community as a whole have major concerns about it. There is marginalization in the number of African women in the workforce. The majority of work that women and female individuals in Nigeria's socioeconomic sectors can access is not of a caliber that is above ordinary. As a result, women are urged to make greater efforts to learn more in the hopes that they will eventually pursue better and more equitable jobs.

This study offers factual proof that human capital and gender disparity have an impact on Nigeria's economic growth. It is even evident that men are disproportionately more likely than women to enrol in education. A wealth of data from developing nations like Nigeria indicates that women's socioeconomic status has a significant impact on whether or not they attend school.

However, findings from this research work point to the fact that Female labour participation positively impacts economic growth just the way male labour participation could. Although Egbulonu and Elionu (2018) post that there has been a significant risen in recent times in female school enrolment, which is a good development, there is a need to maintain this development in order to improve female labour participation in the country. This finding corroborates the standpoint of Kazandjian *et al.* (2019).

The government should evaluate the current education developmental policies and strategies and concentrate more on equitable educational policies in Nigeria generally. More especially, the enhancement of female enrolment rates, social empowerment, skill acquisition and participation in educational institutions will boost the literacy of Nigerian women. They will spur their contribution to the growth of Nigeria through their increased labour participation.

There is a need for the government at all levels to put in place a policy framework that will ensure that Nigeria's educational system is well funded coupled with empowerment and capacity-building programmes for women so as to be well equipped just like their male counteract. This will further increase the rates of women's engagement in private and public employment. The outcome of this will not only enhance equal participation in economic activities but also guarantee a collective enhancement of Nigeria's economic growth.

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