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ASSESSING GENDER INEQUALITY AND SOCIO-ECONOMIC DEVELOPMENT IN NIGERIA (1990–2022): AN ARDL MODEL APPROACH

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ABSTRACT: This study aimed to investigate the impact of gender inequality on socioeconomic development in Nigeria. The study utilized secondary data from 1990 to 2022 on per capita gross domestic product and unemployment as proxies for socio-economic development as well as female-to-male labour force participation rate, female-to-male secondary enrolment, and female to-male adult mortality rate to capture gender inequality. The study made use of the Autoregressive Distributed Lag (ARDL) model based on the outcome of unit root test. The empirical result revealed that female-to-male labour force participation rate, female-to-male secondary school enrolment, and female to-male adult mortality rate is statistically significant for socioeconomic development in Nigeria. Furthermore, the result also reveals that government expenditure and technology were found to be significant determinants of socio-economic development during the study period. The adjusted R-squared of the per capita gross domestic product equation of 84 per cent is higher than that of the unemployment equation, which is 67 per cent. This implies that the explanatory power of the per capita gross domestic product equation is higher than that of the unemployment equation. The study recommends that government should ensure that the female child primary to secondary school education is made compulsory and free in all the states in Nigeria. Government should implement healthcare policies that reduce the gap between female and male adult mortality rates as well as spend more resources on research so as to discover new techniques of production in order to create employment opportunities in the economy.

Keywords: Gender Inequality, Socio-Economic Development, Female-To-Male Labour Force Participation, ARDL Model

INTRODUCTION

Inequality between women and men has been clearly identified by several research works as one of the factors hindering development over the last two decades. In many parts of the world, discrepancies still exist between the sexes in terms of education, employment, financial opportunities, resources, ownership of property, monetary returns for their work, and opportunities to influence decision-making. In a developing economy like Nigeria, it is often challenging to establish evidence-based causal links between the impact of gender inequality on a country's socio-economic development because of the paucity of male and female data on some key socio-

economic indicators. Although some progress has been recorded in the last decade on efforts to address the incessant challenges of women in socio-economic development in Nigeria, it is believed that more still need to be done in the fight for women empowerment and inclusion in key decision-making processes. Gender inequality can be assessed through disparities in education, health, decision-making, and access to economic opportunities such as employment. This is evidence in the distribution of males and women in education enrolment, the available statistic shows that 38 per cent of women in Nigeria lack formal education, as against 25 per cent for men. Furthermore, only 4 per cent of women have higher education, as against 7 per cent of their male counterparts (NBS,2020, p.5). This is assumed to be the major cause of illiteracy and poverty according to NBS report 2020. According to the Word bank (2022), tertiary school enrolment shows that males had a higher enrolment than females in 2021, where 11.24 per cent of females enrolled in tertiary school as against 14.86 per cent of males enrolled and in 2022, 12. This has led to the clamour for empowerment of women through improved enrolment of women in economic and social opportunities.

However, in spite these requests, the engagement of women in economic opportunities is still not significant. For instance, from 1999 till date in politics, only 157 women have been elected into the 469-members of National Assembly (38 Senators and 119 members of the House of Representatives), compared to 2,657 men (616 Senators, 2,041 reps) during the same period. Surprisingly, of the 92 women who contested for the Senate in the February elections 2023, only three women won, while out of the 286 who contested for seats in the House of Representatives, only 15 have been declared winners (Okafor & Ileyemi, 2023).

This is despite past efforts of the government at integrating and implementing the National Gender Policy through the creation of the family support program, the family economic advancement program, the better life for rural women program, formation of the federal ministry of women affairs in 1995 and the implementation of National Gender Policy in 2006 and 2021, and even giving women opportunity to hold elective position (Oyewale, 2019, p. 10). This indicates that gender inequalities remain pervasive in Nigeria. This is visible in Gender Equality Index ranking which ranked Nigeria 118 out of the 134 countries (Randriamaro, 2012). It is also believed that gender inequality is at the centre of the rising unemployment and low per capita income in the country (NBS, 2020). For instance, unemployment statistics reveals that in 2020, 10.612 per cent of male were unemployed while 12.56 per cent female were unemployed; in 2021, males were 10.56 per cent, while the female was 13.25 per cent; in 2022, males increased to 11.453 per cent, while females also increased to 13.54 per cent (World Bank, 2022). This clearly show an increase in female unemployment level, translating to low income. This means poverty may increase since women to some extents are the bread winners of their families. Also, the labour force participation rate indicates that female had a higher participation rate than their male counterpart starting from 1990 till 2022 (NBS, 2022). Therefore, it can be argued whether gender inequality has a role to play in Nigeria's socio-economic development.

In light of the foregoing, this study is carried out to determine: i) the impact of the ratio of female to male labour force participation rate on per capita gross domestic product and unemployment in Nigeria? ii) impact of ratio of female secondary school to male secondary school enrolment on per capita gross domestic product and unemployment in Nigeria? iii) What is the impact of ratio of

female adult mortality rate to male adult mortality rate on per capita gross domestic product and unemployment in Nigeria? To sufficiently provide answers to the following, this study is segmented into five sections: Section One is the introduction, Section Two is the literature review and theoretical framework, Section Three is concerned with the methodology, Section Four handles the presentation of the result while Section five provides the summary and recommendations of the study.

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Conceptual issue

Gender inequality

Gender equality, according to the Canada –Ukraine Gender Fund (2004), means that women and men enjoy the same status and have equal opportunities for realizing their full human rights and potential to contribute to national, political, economic, social, and cultural development, and to benefit from the results. UN-Habitat (2003) states that gender analysis must take into consideration and address differentials in control over and access to land and other resources, inequalities in gender participation and roles in decision-making forums as well as inequalities in representation concerning urban planning and development.

Measure of gender inequality

Two new measures of gender inequality were provided by the Human Development Report (HDR) in year 1995. These measures include; the Gender Empowerment Measure (GEM) and Gender Development Index (GDI). These new measures ranked countries at world level by their performance in gender equality. In an attempt to overcome some of the problems identified by different researchers during the past fifteen years, the 2010 HDR presented a new measure: The Gender Inequality Index (GII). GII is a composite measure, including three dimensions, reproductive health, empowerment, and labour participation of women. These dimensions are derived from five major indicators, including the percentage of higher (secondary level and above) education attainment by women, parliamentary representation of women, labour force participation by women, maternal mortality rate, and adolescent fertility rate. However, this study adopted the dis-aggregated components of GII in it measures of gender inequality. Thus, the ratio of female to male labour force participation rate, the ratio of female secondary enrollment to male secondary enrollment and the ratio of female adult mortality rate to male adult mortality rate are used to capture gender inequality.

Socio-economic development

Social Development focuses on the need to "put people first" in development processes. Poverty is more than low income; it is also about vulnerability, exclusion, unaccountable institutions, powerlessness, and exposure to violence. Social Development promotes the social inclusion of the poor and vulnerable by empowering people, building cohesive and resilient societies, and making institutions accessible and accountable to citizens (World Bank, 2019). Social development also

means working with governments, communities, civil society, the private sector, and the marginalized, including persons with disabilities and Indigenous Peoples, Social Development translates the complex relationship between societies and states into operations (World Bank, 2019).

Theoretical framework

Functionalist theory: This theory was put forward by Talcott Parsons in the 1940s and 1950s. It posits that inequality in gender is a proficient way of creating a division of labour towards the maximization of resources and, hence, increasing growth and development. Gender inequality is assumed to be complementing gender roles. For instance, while women are responsible for taking care of the home, men will be providing for the needs of the family (Ewubare & Ogbuagu, 2017). This approach examines society from a broader perspective and generally pays attention to the social systems that form the society. This idea posits that male and female dynamic roles are contributing factors in determining the socioeconomic development of a country, e.g., the level of unemployment and per capita gross domestic product. That is a particular sex of the populace is answerable for specific labor doings, and another section has the task for other work activities.

Endogenous Growth theory: The endogenous model was developed in the early 80's following the criticism of the neoclassical growth model in explaining long run growth determinants. Some of the early proponents of the endogenous growth theory are Romer (1986) and Lucas (1988). The theory posited that economic growth is an endogenous outcome of the system. Since growth is endogenous, government policies can influence its magnitude and the government plays a vital role in economic growth and development. Capital formation in physical assets of a country, human capital formation and public investment in areas such as infrastructure, and science and technology have a positive impact on output. Similarly, government policies about law and order situation and the economized taxation system encourage growth in an endogenous manner. Therefore, policies that favour a particular sex may hinder socioeconomic development.

Empirical literature

Jinyoung, Lee and Kwanho (2016) introduce a model of gender inequality and economic growth that focuses on the determination of women's time allocation among market production, home production, child-rearing, and child education. The theoretical model is based on Agénor (2012), but differs in several important dimensions. The model was calibrated using micro-level data from Asian economies, and numerous policy experiments were conducted to investigate how various aspects of gender inequality are related to the growth performance of the economy. The analysis shows that improving gender equality can contribute significantly to economic growth by changing females' time allocation and promoting the accumulation of human capital. The study found that if gender inequality is completely removed, aggregate income will be about 6.6 per cent and 14.5 per cent higher than the benchmark economy after one and two generations, respectively, while corresponding per capita income will be higher by 30.6 per cent and 71.1 per cent in the hypothetical gender-equality economy. This is because fertility and population decrease as women participate more in the labour market.

Ewubare and Ogbuagu (2017), analysing the role of gender inequality in the unemployment and economic growth relationship in Nigeria, employed the Engel Granger Error Correction Model and Dynamic Stochastic Variance Decomposition Model in annual data. The result showed that gender inequality is positively and significantly related to unemployment, while economic growth negatively impacted unemployment. Population growth was also found to transmit a significant impulse on unemployment. It was thus concluded that gender inequality is a key factor in the unemployment problem in Nigeria.

Egbulonu and Eleonu (2018) focused on the relationship between gender inequality and economic growth in Nigeria from 1990 to 2016. It also sought to investigate the determinants of female contribution to economic growth in Nigeria as well as to determine the relationship between female participation and economic growth in Nigeria. Secondary data was used to back up our Econometric analyses of how Gender Inequality affects Economic growth in Nigeria. The major findings were that only male school enrollment and female employment rates had a significant impact on Nigeria's economic growth.

Oyewale (2019) assessed the implication of gender inequality on economic development in the South Western region of Nigeria. The methodology adopted for the study was a historical approach. Hence, the study is based on primary and secondary sources. The primary sources comprised oral interviews, newspapers, and government gazettes, while relevant books were consulted as useful secondary sources. The study discovered that a number of factors have limited their input and productivity, and it is not gainsaying to state that if this is not checked, the region and in a much larger context, the country would continue to underperform economically.

Ngwoke (2020) ascertained theoretically the implications of gender inequality in education for socioeconomic development in Nigeria. Adopting content analyses, the study identified education as a fundamental human right irrespective of gender or any other reason. The study furthermore identified education as a catalyst for socioeconomic growth and as a strong driver of poverty reduction through the promotion of human capital development, among others. Thus, the study observed that gender inequality in education has both social and economic consequences for Nigeria. Socially, gender inequality in education makes women inferior to their male counterparts and thus exposes them to all manners of marginalization, exploitation and domestic violence. Economically, gender inequality in education excludes women from the competitive and lucrative workforce because of their poor educational qualifications, which are necessary for certain areas of the economy.

Dupe (2021) examined how socio-cultural factors, workplace discrimination and women participation in political activities can translate to sustainable development in Nigeria. The study adopted survey research design. One hundred and sixty females were randomly selected from the State Secretariat, Ibadan as a sample population for the study. A set of self-structured questionnaires, which had four sections, was used as an instrument for data collection. One hundred and forty properly filled questionnaires were analyzed. Three hypotheses were generated and tested. The study establishes that there is no equality between the genders, that women are discriminated against and still play the second fiddle, that women are discriminated against and

still play the second fiddle, and that inequality hinders the coveted sustainable development in the nation.

Pinho-Gomes et al. (2021) investigated whether gender equality was correlated with life expectancy in women and men. The study made use of gender equality data in the 27 European Union (EU) member states between 2010 and 2019 which was estimated using a modified Gender Equality Index (mGEI), based on the index developed by the European Institute for Gender Equality. The correlation between this mGEI and life expectancy and the gender gap in life expectancy was calculated using the Spearman correlation coefficient. The results show between 2010 and 2019, life expectancy increased more for men than women, which resulted in a narrowing of the gender gap in life expectancy in the European Union. During the same period, there was an increase in gender equality, as measured by the mGEI, although with substantial heterogeneity between countries. There was a strong correlation between the mGEI and the gender gap in life expectancy (−0.880), which was explained by a stronger correlation between the mGEI and longer life expectancy in men than in women (0.655 vs 0.629, respectively). The domains of the mGEI most strongly associated with a narrowing of the gender gap in life expectancy were health, money and knowledge, while power was the domain with the weakest association.

Ram, Moradhvaj, Chakravorty and Goli (2022) investigated the association between gender inequality and growth outcomes in the form of gross domestic product per capita across 158 countries in the world during 2000-15. The study found that the Gender Inequality Index has a significant inverse correlation with GDP per capita (r=-0.7886), While the gender development index (GDI hereafter) shows a positive correlation with GDP per capita (r=0.574). The results from the multivariate log-linear model show that countries with a high level of gender inequality index (GII hereafter) have significantly lower levels of GDP per capita even after controlling for other covariates. This study evidentially suggests that the economic policy of the countries should prioritize autonomy, agency and empowerment of women to improve their participation in the national economy.

Mateos et al. (2022) analyze the influence of gender inequality on the gender gap in life expectancy globally. The study adopted regression analysis between the gender gap in relativized life expectancy and the UN Gender Inequality Index (GII), with a sensitivity analysis conducted for its three dimensions, stratified by the six World Health Organization (WHO) regions. The model was adjusted by taking into consideration gross national income (GNI), democratic status and rural population, and the results indicated a positive association between the European region (ß=0.184) and the Americas (ß=0.136) in our adjusted model. The study reveals that for the African region, the relationship between gender equality and the life expectancy gender gap was found to be negative (ß=-0.125). The findings suggest that in the World Health Organization European region and the Americas, greater gender equality leads to a narrowing of the gender life expectancy gap, while it has a contrary relationship in Africa.

Research gap

From the empirical literature reviewed, the argument on the impact of gender inequality on socio-economic development in both developed and developing countries is inconclusive. Egbulonu and

Eleonu (2018) study adopted the error correction mechanism for analysis using male and female school enrolment to measure gender inequality while economic growth was used to capture socio-economic development. Oyewale (2019) focused on the South Western region using historical analysis to assess the implications of gender inequality on economic development while Ngwoke's (2020) study focused on gender inequality in the area of education but used content analysis to draw conclusions of the study but none of these tried to adopt the gender inequality index in their analysis nor consider the components of the gender inequality index in their analysis in the context of Nigeria. Therefore, unlike previous studies that focused on individual gender indicators, this study integrates components of the Gender Inequality Index (GII) to assess its broader socio-economic implications in Nigeria.

RESEARCH METHODOLOGY

The Model

This study adopted an ex-post facto design in assessing the relationship between gender inequality and socio-economic development in Nigeria. The model for investigating the impact of gender inequality on socioeconomic development in Nigeria is divided into two: the first is the growth equation, and the second is the unemployment equation. Unemployment and economic growth were used to capture socio-economic development because available statistic as cited above indicates that female unemployment was rising faster as the economy was growing within the same period. The baseline model is anchored on the Solow growth model which follows the Cobb-Douglas production function specification stated as:

$$Y = Af(K, L) \qquad (3.1)$$

Where; Y is aggregate output,A is efficiency parameter or Solow's residual, K is capital and L is labour. In line with Mankiw, Romer and Weil (1992), K in equation (3.1) is further disaggregated into human capital (K_h) and physical capital (K_p). Therefore, equation (3.1) becomes:

$Y = Af(Kh, Kp, L) -$ (3.2), In empirical form, equation (3.2) is stated as follows: $Y = AKh^{\alpha_1}Kp^{\alpha_2}L^{\alpha_3}$ - (3.3), Equation 3.3 is transformed thus; Y = A α_1Kh, α_2Kp, α_3L (3.4); Where; K_h is human capital, K_p is physical capital and$L\ captures\ labour$ whereas α_1, α_2 and α_3 are parameters to be estimated. According to Solow (1957), the efficiency parameter A (Solow's residual), as captured in equations 3.1, 3.2, 3.3 and 3.4, acts like the residual term in equation 3.4. This implies that the following holds according to the Solow and endogenous theories;

$A = f(GEXP, TECH), Kh = f(RLPR, RSSR, RMFM), KP = f(GDI), Y = PGDP$

The growth equation is thus presented as;

PGDP = f(RLPR, RSSR, RMFM, GDI, GEXP, TECH) 3.5

In the econometric form, the equation is represented as;

$PGDP = a_0 + a_1 RLPR + a_2 RSSR + a_3 RMFM + a_4 GDI + a_5 GEXP + a_6 TECH + u$ 3.6

The semi log-form of the equation is stated as follows;

$Log(PGDP) = a_0 + a_1 (RLPR) + a_2 (RSSR) + a_3 (RMFM) + a_4 Log (GDI) + a_5 Log (GEXP) + a_6 Log (TECH) + u$ 3.7

The theoretical expectations about the variables are that a_1, a_2, a_3 ><0 while a_4, a_5 and a_6 are >o.

The second equation that captures the socio-economic development in Nigeria is the unemployment equation. The equation is anchored on the Keynesian theory of unemployment. Keynesian economists hold the view that unemployment occurs when there is not enough aggregate demand in the economy to provide a jobs for everyone who want jobs for everyone who wants to work. Therefore, the equation is as stated below;

UNM = f(RLPR, RSSR, RMFM, GDP, POPGR, GEXP, TECH) 3.8

In the econometric form, the equation is represented as;

$UNM = a_0 + a_1 RLPR + a_2 RSSR + a_3 RMFM + a_4 GDP + a_5 POPGR + a_6 GEXP + a_7 TECH + u$ 3.9

The semi log-form of the equation is stated as follows;

$UNM = a_0 + a_1 (RLPR) + a_2 (RSSR) + a_3 (RMFM) + a_4 Log (GDP) + a_5 Log (POPGR) + a_6 Log (GEXP) + a_7 Log (TECH) + u$ 3.10

The theoretical expectations about the variables is that a_1, a_2, a_3, a_4 and a_7 are <0 while a_5 anda_6 ><0.

Sources of data

The data on female labour force participation rate, male labour force participation rate, female secondary school enrolment, male secondary enrolment, growth rate of gross domestic product and gross fixed capital formation used in this study was sourced from publications of the World Development Indicator (World Bank, 2022) while data on the other variables were sourced from the National Bureau of Statistic (NBS, 2022) and Central Bank of Nigeria (CBN, 2022).

Model estimation procedure

The model estimation procedure includes descriptive statistics to understand the behaviour of the variables, a unit root test to determine the order of integration, a causality test technique to determine the direction of causality, and a co-integration test to determine whether a run relationship exists. An Autoregressive Distribution lag model and Error correction model were used for analysis and stability tests.

PRESENTATION OF RESULTS, ANALYSIS AND DISCUSSION OF FINDINGS

Presentation of results and analysis

Presentation of descriptive statistics results

Table 1: Descriptive statistics for Per Capita Gross Domestic Product equation

	PGDP	RLPR	RSSR	RMFM	GDI	GEXP	TECH
Mean	4.292909	1.574376	0.374875	0.901258	9447.882	3395.254	0.183558
Median	4.230061	1.482057	0.319916	0.903998	1739.637	2038.000	0.143235
Maximum	15.32916	1.960537	0.589813	0.923918	98783.88	11348.48	0.805431
Minimum	-2.035119	1.232143	0.226114	0.869017	29.65120	60.26820	0.089104
Std. Dev.	3.969467	0.233447	0.116269	0.016686	23143.93	3437.762	0.133296
Skewness	0.464293	0.263363	0.219085	-0.464218	3.507235	0.974667	3.329268
Kurtosis	3.359134	1.597993	1.402315	2.166772	13.75622	2.850933	15.58758
Jarque-Bera	1.362968	3.084214	3.773812	2.139858	226.7363	5.255415	278.8271
Probability	0.505866	0.213930	0.151540	0.343033	0.000000	0.072244	0.000000
Sum	141.6660	51.95441	12.37086	29.74152	311780.1	112043.4	6.057403
Sum Sq. Dev.	504.2134	1.743919	0.432590	0.008909	1.71E+10	3.78E+08	0.568568
Observations	33	33	33	33	33	33	33

Source: Author's computation, 2023

The result reveals that gross domestic investment (GDI) has the highest mean value of 9447.882 while GDI has the highest maximum value of 98783.88. The minimum value estimate shows that government expenditure has the highest estimate of 60.286 and is followed by GDI with an estimate of 29.65120 while TECH has the lowest estimated value of 0.089104. The estimate of the standard deviation shows that GDI estimate has the highest estimate of 23143.93. The skewness result indicates that all the variables are positively skewed except ratio of female to male adult mortality rate (RMFM) which are negatively skewed. The kurtosis estimate indicates that RLPR, RSSR, RMFM and GEXP are all less than three, this implies that they are flat and platykurtic in nature while the estimate for GDI and TECH are greater than three, it signifies that these variables are leptokurtic in nature. The Jarque-Bera test indicates that all the variables are normally distributed within the period of analysis.

Table 2: Correlation matrix result for PGDP equation

	PGDP	RLPR	RSSR	RMFM	GDI	GEXP	TECH
PGDP	1.000000	-0.164401	-0.070959	0.506304	-0.090878	-0.213437	-0.138146
RLPR	-0.164401	1.000000	0.734743	0.094631	0.373024	0.609389	0.148179
RSSR	-0.070959	0.734743	1.000000	0.114271	0.452665	0.648065	0.233280
RMFM	0.506304	0.094631	0.114271	1.000000	-0.170842	-0.051711	-0.338809
GDI	-0.090878	0.373024	0.452665	-0.170842	1.000000	0.695924	0.791667
GEXP	-0.213437	0.609389	0.648065	-0.051711	0.695924	1.000000	0.460484
TECH	-0.138146	0.148179	0.233280	-0.338809	0.791667	0.460484	1.000000

Source: Authors computation, 2023

From the results as presented above, it shows that there is no high level of correlation amongst the variables considered in the equation, hence, multi-collinearity is absent in our estimated results.

Table 3: Descriptive statistics for unemployment (UNM) equation

	UNM	RLPR	RSSR	RMFM	GDP	POPGR	GEXP	TECH
Mean	13.16242	1.574376	0.374875	0.901258	49933.91	2.601437	3395.254	0.183558
Median	11.90000	1.482057	0.319916	0.903998	28662.47	2.607676	2038.000	0.143235
Maximum	25.70000	1.960537	0.589813	0.923918	153234.1	2.987680	11348.48	0.805431
Minimum	8.390000	1.232143	0.226114	0.869017	499.6769	2.488785	60.26820	0.089104
Std. Dev.	4.734978	0.233447	0.116269	0.016686	53033.53	0.108724	3437.762	0.133296
Skewness	1.136562	0.263363	0.219085	-0.464218	0.797256	1.628979	0.974667	3.329268
Kurtosis	3.370485	1.597993	1.402315	2.166772	2.216133	6.546007	2.850933	15.58758
Jarque-Bera	7.293482	3.084214	3.773812	2.139858	4.340761	31.88412	5.255415	278.8271
Probability	0.026076	0.213930	0.151540	0.343033	0.114134	0.000000	0.072244	0.000000
Sum	434.3600	51.95441	12.37086	29.74152	1647819.	85.84741	112043.4	6.057403
Sum Sq. Dev.	717.4406	1.743919	0.432590	0.008909	9.00E+10	0.378267	3.78E+08	0.568568
Observations	33	33	33	33	33	33	33	33

Source: Author's computation, 2023.

The result in Table 3 shows that gross domestic product (GDP) has the highest estimated mean value of 49933.91. The estimated results for the median and maximum values show that GDP has the highest value of 28662.47 and 153234.1, respectively. The estimate for minimum value shows that GDP has the highest estimated value of 499.6769. The standard deviation estimates indicate that GDP with an estimated value of 53033.53 is the highest. The skewness result estimates reveal that all the variables have a positive right long tail except RMFM which is negatively skewed. The kurtosis result shows that RLPR, RSSR, GDP, GEXP and RMFM are all less than three, this implies that they are flat and platykurtic in nature while the estimate of unemployment UNM, POPGR and TECH are greater than three, this indicates that they are leptokurtic in nature. The Jarque-Bera test indicates that all the variables are normally distributed.

Table 4: Correlation matrix for unemployment equation

	UNM	RLPR	RSSR	RMFM	GDP	POPGR	GEXP	TECH
UNM	1.000000	-0.050947	0.066980	0.619680	-0.211197	0.036297	-0.162580	-0.127566
RLPR	-0.050947	1.000000	0.734743	0.094631	0.661275	0.645594	0.809389	0.148179
RSSR	0.066980	0.734743	1.000000	0.114271	0.675465	0.748156	0.848065	0.233280
RMFM	0.619680	0.094631	0.114271	1.000000	-0.083715	0.060437	-0.051711	-0.338809
GDP	-0.211197	0.661275	0.675465	-0.083715	1.000000	0.763145	0.787373	0.381474
POPGR	0.036297	0.645594	0.748156	0.060437	0.763145	1.000000	0.807119	0.658105
GEXP	-0.162580	0.809389	0.848065	-0.051711	0.787373	0.807119	1.000000	0.460484
TECH	-0.127566	0.148179	0.233280	-0.338809	0.381474	0.658105	0.460484	1.000000

Source: Author's computation, 2023

The estimated result indicates that there is no evidence of high correlation between the variables considered in the equation.

4.1.2 Presentation and analysis of econometric result for Growth Rate of Gross Domestic Production (GRGDP) equation

Table 5: Unit root result

	ADF		PP	
	LEVEL	**IST DIFFERENCE**	**LEVEL**	**IST DIFFERENCE**
RLPR	-1.419647	-8.416099	-1.257628	-8.481898
RSSR	-0.666792	-5.943015	-0.666792	-5.943015
RMFM	-3.237762		-1.848590	-3.763098
GDI	2.928515	-3.835961	0.490636	-5.501960
GEXP	4.359838	-4.971027	3.270883	-3.835648
TECH	0.270757	-3.529742	0.473359	-3.562503
GDP	-1.246402	-5.757924	2.831233	-3.718299
POPGR	1.423385	-4.432553	2.596645	-3.716394
PGDP	-3.670630		-3.797679	
UNM	-2.040171	-5.757924	-2.098693	-5.757924
Critical value at level 1% = -3.653730 5% = -2.957110 10% = -2.617343 Critical value at first difference 1% = -3.661661 5% = -2.960411 10% = -2.619160			Level 1% = -3.653730 5% = -2.957110 10% = -2.617434 Critical value at first difference 1% = - 3.66166 5% = -2.960411 10% = -2.619160	

Source Author's computation, 2023 using E-view

From the unit root result which help to check if the statistical properties of the variables remain constant overtime, the Augmented Dickey Fuller (ADF) unit root result reveals that all the variables were stationary at first difference except ratio of female adult mortality rate to male adult mortality rate (RMFM) and growth rate of gross domestic product (GRGDP). However, the Phillip Perron unit root test result indicates that all the variables are stationary at first difference exception

of per capita gross domestic product (PGDP) which is stationary at level. The study decided to stick with ADF test for further analysis since both gave almost the same results.

Table 6: VAR Lag order selection criteria for PGDP equation

VAR Lag Order Selection Criteria
Endogenous variables: PGDP RLPR RSSR RMFM GDI GEXP TECH
Exogenous variables: C
Included observations: 31

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-508.6306	NA	660999.2	33.26649	33.59029	33.37204
1	-307.2724	298.7896	38.68134	23.43693	26.02736*	24.28134
2	-238.5249	70.96516*	18.46600*	22.16290*	27.01995	23.74617*

Source: Author's computation, 2023

The VAR lag length result presented in Table 6 shows that the lag length is two.

Table 4.7: Granger causality results for growth rate equation

Pairwise Granger causality test

Null hypothesis	Obs	f-statistic	Prob.
RLPR does not granger cause PGDP	31	0.65808	0.5263
PGDP does not granger cause RLPR		0.89036	0.4227
RSSR does not granger cause PGDP	31	1.73436	0.1963
PGDP does not granger cause RSSR		4.17650	0.0267
RMFM does not granger cause PGDP	31	0.47914	0.6247
PGDP does not granger cause RMFM		0.64078	0.5350

Source: Author's computation, 2023

The Granger casualty result shows that there is no casualty between the ratio of female to male labour force participation rate (RLPR) and the ratio of female adult mortality rate to male adult mortality rate (RMFM) with the dependent variable per capita gross domestic product (PGDP). However, there is a one-way causality between the ratio of female to male secondary school

enrolment (RSSR) and per capita gross domestic product (PGDP), with the causality running from RSSR to PGDP.

Table 8: ARDL bound test result for growth rate equation

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	10.76748	10%	1.99	2.94
K	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99

Source: Author's computation, 2023

From the bound test result in table 8 above, there exist a long run relationship amongst the variables considered in the study.

Table 9: Per Capita Gross Domestic Product long run ARDL result

Dependent Variable: D(PGDP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOG(RLPR))	7.791913	6.271500	1.242432	0.2300
D(LOG(RSSR))	17.52381	6.088923	2.877982	0.0100
LOG(RMFM)	174.5124	25.63056	6.808763	0.0000
D(LOG(GDI))	0.638508	0.939708	0.679475	0.5055
D(LOG(GEXP))	-23.36477	6.782216	-3.445005	0.0029
D(LOG(TECH))	0.824759	1.195171	0.690076	0.4989
C	24.53814	2.805292	8.747090	0.0000

Source: Author's computation, 2023

According to the estimated result in Table 9 above, all the explanatory variables are consistent with the a priori expectation except the log of government expenditure- D(LOG((GEXP)), which violated its a priori expectation. This indicate that a one per cent increase in log of ratio of female to male labour force participation rate-D(LOG(RLPR)), log of ratio of female to male secondary school enrollment-D(LOG(RSSR)), log of ratio of female to male adult mortality rate-D(LOG(RMFM)), log of gross domestic investment-D(LOG(GDI)) and log of technology -D(LOG(TECH)) will lead to about 7.791913 per cent, 17.52381 per cent, 174.5124 per cent, 0.638508 per cent and 0.824759 per cent increase in socio-economic development indicator per capita gross domestic product in Nigeria respectively. Also, a one per cent increase in the log of government expenditure-D(LOG(GEXP)) will lead to a reduction of about 23.36477 per cent in per capita gross domestic product (PGDP). The t-statistic result indicates that all the explanatory

variables are statistically significant except log of gross domestic product and log of technology which are statistically insignificant within the period of analysis.

Table 10: ARDL short-run result for Per Capita Gross Domestic Product (PGDP)

Variable	Coefficient	Std.Error	t-statistics	Prob
DLOG(RSSR)	8.558335	2.152931	3.975201	0.0009
DLOG(RMFM)	605.7456	81.18207	7.461569	0.0000
DLOG(GEXP)	-6.822195	1.203726	-5.667567	0.0000
DLOG(GEXP (-1))	8.419407	1.290209	6.525613	0.0000
CointEq(-1)*	-0.891840	0.081536	-10.93795	0.0000

R-square = 0.859036

Adjusted r-squared = 0.836481

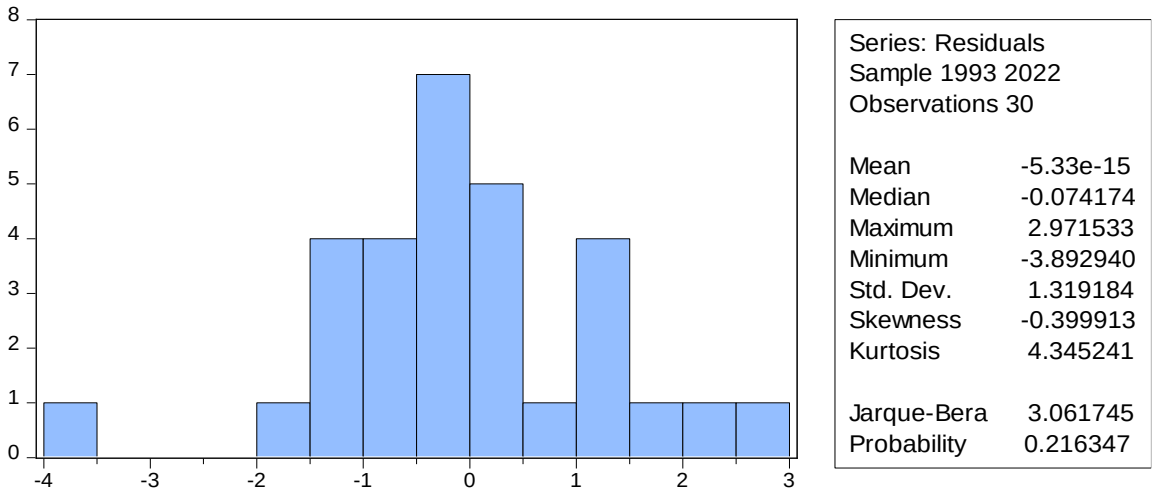
Durbin-Watson stat = 2.708353

Source: Author's computation, 2023.

From the result above, DLOG(RSSR), DLOG(RMFM) and DLOG (GEXP (-1)) are consistent with a priori expectation, while DLOG(GEXP) is not consistent with a priori expectation. This indicates that a one per cent increase in log of ratio of secondary school enrollment-D(LOG(RSSR), log of ratio of female to male adult mortality rate- D(LOG(RMFM) and one year lag of log government expenditure-DLOG(GEXP(-1)) will lead to 8.558335 per cent, 605.7456 per cent and 8.414907 per cent increase in per capita gross domestic product on Nigeria respectively. Also, a one per cent increase in the log of current year government expenditure – DLOG(GEXP) will lead to a reduction of about 6.822195 per cent in the level of per capita gross domestic product.

The t-statistic result reveals that all the explanatory variables are statistically significant at a 5 per cent level of significance. The adjusted R-squared estimate of 0.859036 implies that about 85.90 per cent of the total variations in per capita gross domestic product are explained by the factors captured in the study, leaving the remaining 14.1 per cent for other factors not captured in the study. This indicate that the model has a high explanatory power. The Durbin-Watson statistic estimate of 2.708353 falls on the no-autocorrelation region; hence, we conclude that there is no auto-correlation in our result estimate. The error correction estimated coefficient of -0.891840, which satisfies all the necessary conditions, shows that about 89.18 per cent of the short-run deviations in per capita gross domestic product can be corrected in the long run.

Figure 1: Normality Test



Source: Author's computation,2023.

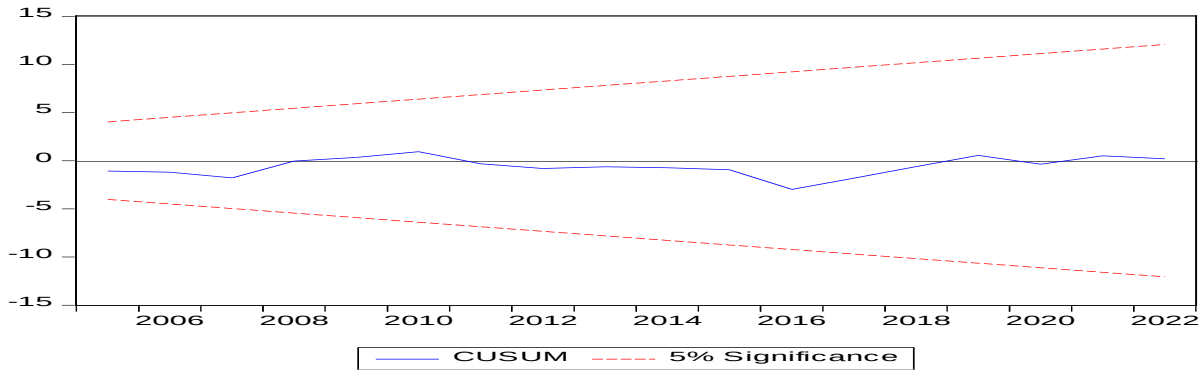
According to figure 1 above, Jarque-Bera result indicate that the equation is normality distributed within the period of analysis.

Table 11: Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.445759	Prob. F(2,16)	0.6481
Obs*R-squared	1.583372	Prob. Chi-Square(2)	0.4531

The result's probability value is greater than 0.05, which shows that the estimate is not significant. Hence, we accept the null hypothesis, which states that there is no serial correlation in our estimated result.

Figure 2: Stability Test



Source: Author's computation, 2023

Based on the CUSUM result above, the result is stable over the period of analysis. This is because the blue line lies between the upper and the lower red lines.

Presentation and analysis of econometric results for unemployment (UNM) equation

Table 12: VAR lag order selection criteria for unemployment equation

Endogenous variables: UNM RLPR RSSR RMFM GDP POPGR GEXP TECH
Exogenous variables: C
Included observations: 31

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-421.8623	NA	152.9657	27.73305	28.10311	27.85368
1	-160.7527	370.6071	0.000527	15.01630	18.34686	16.10198
2	-29.97368	118.1230*	1.82e-05*	10.70798*	16.99902*	12.75870*

Source: Author's computation, 2023

Based on the result as present above, it shows that the lag length for the second equation is two. This can be seen from the LR, FPE, AIC, SC and HQ criterion respectively.

Table 13: Granger causality test result for unemployment equation

Pairwise Granger causality result

Null hypothesis	Obs	F-statistic	Prob
RLPR does not Granger cause UNM	31	0.51159	0.6054
UNM does not Granger cause RLPR		4.03078	0.0299
RSSR does not Granger cause UNM	31	1.97982	0.1584
UNM does not Granger cause RSSR		5.93464	0.0075
RMFM does not Granger cause UNM	31	2.14474	0.1374
UNM does not Granger cause RMFM		0.13162	0.8773

Source: Author's computation, 2023

According to the causality result as presented in Table 13 above, the ratio of female to male labour force participation rate and ratio of female to male secondary school enrolment has a uni-directional causality with the unemployment rate with the causality running from unemployment rate to ratio of female to male labour force participation rate and ratio of secondary school enrolment. However, there is no causal relationship between the ratio of female to male adult mortality rates.

Table 14: ARDL bound test for unemployment equation

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	3.648583	10%	1.92	2.89
K	7	5%	2.17	3.21
		2.5%	2.43	3.51
		1%	2.73	3.9

Source: Author's computation, 2023

Based on the result, there exist a long run relationship among the variables adopted in the study. This is due to the fact that stimulated F-statistic of 3.648583 is greater than the critical values of 3.21 at the upper bound 1 (1) and 2.17 at the lower bound 1(0) all at 5 per cent level of significance.

Table 15: ARDL long run result for unemployment rate

Dependent Variable: LOG(UNM)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOG(RLPR))	-75.57499	27.11880	-2.786811	0.0210
D(LOG(RSSR))	-32.87023	11.31352	-2.905393	0.0129
LOG(RMFM)	105.7131	220.3450	0.479762	0.6408
D(LOG(GDP))	73.65760	24.87137	2.961542	0.0121
D(POPGR)	-35.70516	13.39794	-2.664973	0.0212
D(LOG(GEXP))	-22.32223	5.882143	-3.794915	0.0036
D(LOG(TECH))	83.42956	79.04449	1.055476	0.3138
C	-6.801857	44.15285	-0.154053	0.8804

Source: Author's computation, 2023

According to the result in Table 15 above, it shows that LOG(RMFM), D(LOG(GDP)) and D(LOG(TECH)) were consistent with their a priori expectations while the log of ratio of female to male labour force participation rate D(LOG(RLPR)), log of the ratio of female to male secondary enrolment-D(LOG(RSSR)), population growth rate-D(POPGR) and log of government expenditure-D(LOG(GEXP)) was inconsistent with their a priori expectation. This implies that a one per cent increase in the ratio of female to male adult mortality rate (RMFM), log of gross domestic product-D(LOG(GDP)) and log of technology-D(LOG(TECH)) will lead to an increase of about 105.7131 per cent, 73.65760 per cent and 83.42956 per cent in the unemployment rate in Nigeria. However, a one per cent increase in D(LOG(RLPR)), D(LOG(RSSR)) and D(LOG(GEXP)) will stimulate a reduction of about 75.57499 per cent, 32.87023 per cent and 22.32223 per cent in the level of unemployment. Also, the result indicates that an increase of one unit in population growth rate-D(POPGR) will lead to a 35.70516 per cent reduction in the level

of unemployment in Nigeria. The result also reveals that all the explanatory variables are statistically significant except LOG(RMFM) and D(LOG(TECH)), which are statistically insignificant at 5 per cent and 10 per cent levels of significance.

Table of 16: ARDL short-run result for unemployment

Variables	Coefficient	Std. Error	T-statistic	Prob
DLOG(RLPR)	-11.95368	5.194987	-2.301003	0.0420
DLOG(RSSR)	-30.54183	4.516824	-6.761792	0.0000
DLOG(RMFM)	-1930.031	444.5457	-4.341582	0.0012
DLOG (RMFM (-1))	1561.071	391.6187	3.986201	0.0021
DLOG(GDP)	23.47922	5.646318	4.158324	0.0016
DLOG (GDP (-1))	-13.02455	5.216425	-2.496835	0.0297
DLOG (POPGR)	20.11743	9.743368	2.064730	0.0633
DLOG (GEXP)	-3.877452	1.539219	-2.519104	0.0285
DLOG(TECH)	2.841066	1.116603	2.544383	0.0273
DLOG (TECH (-1))	-3.891156	1.063434	-3.659047	0.0038
CointEq (-1)*	-0.194523	0.027804	-6.996153	0.0000

R-squared= 0.781689

Adjusted R-squared = 0.666788

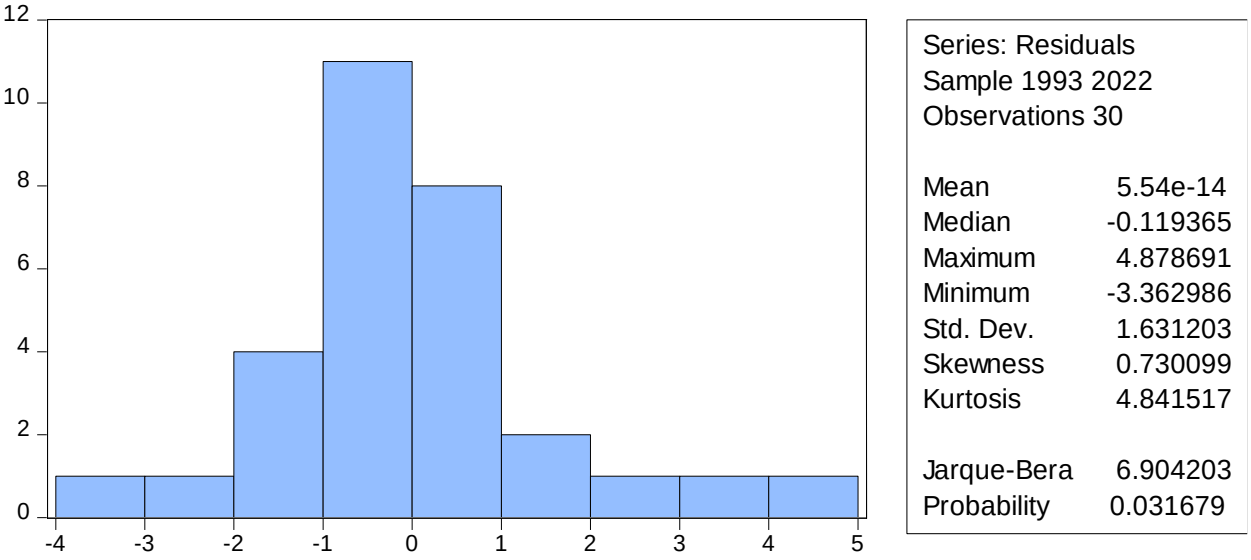
Durbin-Watson stat = 2.602550

Source: Author's computation, 2023

From the estimated result in Table 16, D(LOG(RMFM (-1)), DLOG(GDP), D(POPGR) and DLOG(TECH) were consistent with the theoretical expectation while DLOG(RLPR), DLOG(RSSR), DLOG(RMFM), DLOG(GEXP) and DLOG(TECH (-1)) were not consistent with the a priori expectation. Furthermore, the result depicts a one per cent increase in one year lag of log ratio of female to male adult mortality rate – DLOG(RMFM(-1)), log of gross domestic product-DLOG (GDP) and log of technology- DLOG(TECH) will lead to an increase of 1561.071 per cent, 23.47922 per cent and 2.841066 per cent in unemployment respectively. More so, a one-unit increase in population growth rate at the current year – DLOG(POPGR) will stimulate about a 20.11743 unit increase in the level of unemployment in Nigeria. Also, a one per cent increase in DLOG(RLPR), DLOG(RSSR), DLOG(RMFM), DLOG(GDP(-1)), DLOG(GEXP) and DLOG(TECH(-1)) will result in a reduction of 11.95368 per cent, 30.54183 per cent, 1930.031 per cent, 13.02455 per cent, 3.877452 per cent and 3.891156 per cent in unemployment in Nigeria.

According to the estimated result, all the explanatory variables are statistically significant at a 5 per cent level of significance. The adjusted R-squared estimate of 0.666788 reveals that about 66.67 per cent of the total variations in the level of unemployment in Nigeria are explained by the factors considered in the study, leaving the remaining 33.33 per cent for other factors not captured in the study. This implies that the model has a fairly high explanatory power and can be relied upon in forecasting the changes in Nigeria's unemployment rate. The Durbin-Watson statistic estimate of 2.602550 falls on the no auto-correlation region; hence, we conclude that there is no auto-correlation in the estimated result. The error correlation estimates of -0.194523 satisfies all the conditions which is that, it must be negative, it be significant and must be less than 1. This, therefore, implies that only about 19.45 per cent of the short-run deviation is corrected in the long run.

Figure 3: Normality test



Source: Author's computation,2023.

According to figure 3 above, the result reveals that the model is not normally distributed within the period of analysis. This is because the probability of the Jarque-Bera is less than 0.05.

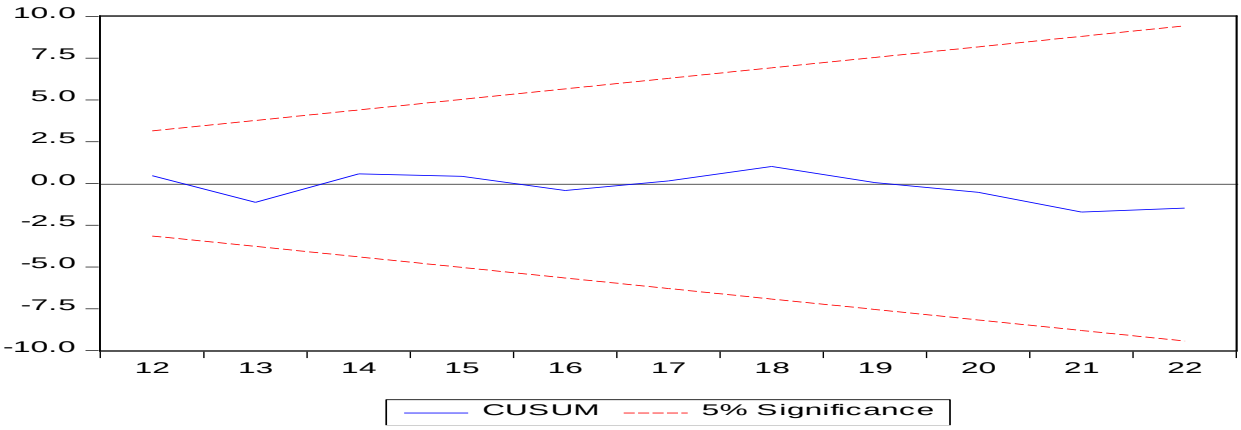
Table 17: Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.938308	Prob. F(2,9)	0.6042
Obs*R-squared	1.185071	Prob. Chi-Square (2)	0.4527

Source: Author's computation,2023

From the result, there is no serial correlation in the estimated result. This confirms the Durbin Watson result which also concluded that there is no serial correlation in the result.

Figure 4: Stability test



Source: Author's computation, 2023.

Figure 4 above shows that the model is stable over the period of analysis because the CUSUM of squares figure shows that the blue line lies between the upper and lower red lines.

DISCUSSION OF FINDINGS

Gender inequality has been an issue of concern to different scholars as it is believed it may have had undesirable effects on a country's per capita gross domestic product, life expectancy, literacy rate and even on employment opportunities. The outcome of the result revealed that in the long run, the ratio of female to male labour force participation rate has no significant impact on per capita gross domestic product, while the ratio of female to male secondary school enrolment impacted positively on per capita gross domestic product, its impact was statistically significant for per capita gross domestic product and unemployment in Nigeria. The positive impact of secondary school enrolment on per capita GDP suggests that improving female education can significantly enhance economic productivity in Nigeria, thereby leading to a reduction in female unemployment. This contradicts the findings of Risikat (2012) that female education does not have any significant impact on real GDP. This may be due to source of data and the period of analysis covered in the study. However, the impact of the ratio of female to male force participation significance also contradicts the findings of Egbulonu & and Eleonu (2018) that only male school enrollment and female employment rate have a significant impact on per capita gross domestic product. This outcome is due to the method of analysis and the period covered in the study. However, in the short run, the result shows that the ratio of female to male secondary enrollment is significant for increasing per capita gross domestic product as well as reducing unemployment in Nigeria. This may also be due to the equal opportunity available for both male and female groups in Nigeria. However, the impact of the ratio of female to male labour force participation rate was towards increasing the level of unemployment. This corroborates the findings of Ewubare and Ogbuagu (2017) that gender inequality has a positive and significant impact on unemployment.

Furthermore, the study discovered that the ratio of female to male secondary school enrollment impacted negatively on unemployment both in the long run and in the short run; this implies that if more females are given opportunities to attain secondary school, unemployment will reduce within the shortest period of time. This supports the findings of Ngwoke (2020) that the more women educated, the lesser the unemployment rate in Nigeria. The study also discovered that the ratio of female to male adult mortality rate at the current period has a negative and significant impact on unemployment in Nigeria in the short run, while its impact on per capita gross domestic product is positive and significant in the long run and in the short run. This suggests that adult mortality has implications for unemployment in Nigeria. By and large, this study contributes to the ongoing discourse on gender inequality by providing empirical evidence on its economic implications in Nigeria, thereby informing future policy decisions.

Policy recommendation

Based on the findings of the study, the following are recommended:

i. The government should ensure that female secondary school education is made compulsory in Nigeria by increasing budgetary allocation to the education sector.
ii. Female labour force participation rate should be encouraged and adequately monitored. This can be achieved by ensuring that about 40 per cent of all recruitment quotas in any recruitment process consider the interest of women.
iii. Implement healthcare policies that reduce the gap between female and male adult mortality rates.
iv. Ensure that women have equal access to healthcare services and are not disadvantaged due to gender-related factors. This can be achieved by increasing budgetary allocation to the health sector.

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