Agriculture as a stimulant for Sustainable Development in ECOWAS

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ABSTRACT

The study utilised secondary data sourced from the World Development Indicators (WDI), International Labour Organisation (ILO), United Nations Educational, Scientific and Cultural Organisation (UNESCO), and the System Generalised Method of Moments (SGMM) econometric technique was used to analyse the data. Sustainable Development Goal (Goal 1) which was proxied by poverty, used as the dependent variable, while agriculture value added, employment in the agricultural sector, inequality, literacy rate, population growth rate and gross domestic savings were the explanatory variables. The study found out that both agriculture value added and employment in the agricultural sector were statistically significant in explaining poverty and negatively related to poverty in the ECOWAS sub-region. Therefore, based on the findings, the study recommended that the governments of ECOWAS countries should focus more on agriculture so as to be exporters of cash crops that will generate foreign exchange for their economies and increase savings that can be used to alleviate and eliminate poverty among the people.

Keywords: Agriculture, Poverty, ECOWAS, Sustainable Development
JEL Codes: Q1, Q55, Q0

1. INTRODUCTION

To say that poverty and hunger are the two main problems faced by African countries is stating the obvious[1], since the number of people who are wallowing in poverty and hunger is on the increase since the beginning of the decade.[2] The Food and Agricultural Organisation (FAO) posits that globally, 815 million individuals are suffering from hunger due to the high incidence of poverty in 2016; this marked the first upsurge in the rate of hunger since the food price disaster of 2007-2008, and is a substantial upsurge from the 777 million who experienced under-nourishment in 2015. According to the FAO (2017) report, this setback is due to the discrepancy and the impact of the change in climate in parts of South East Asia, West Asia and sub-Saharan Africa.[2]

The agricultural sector occupies an essential position in the West African sub-region and the sector is recognised as the heartbeat of the sub-regional economy. This is because its impact cuts across societies at various stages given that the West African economies in terms of labour force, incomes and access to food rely mainly on the sector. To better situate the above argument, the Economic Community of West African States' (ECOWAS) agricultural sector generates more than 35% of the Gross Domestic Product of the sub-region.[2]. However, agriculture has largely remained unattractive to the populace, especially the youths for reasons which include; low returns on time and input investments, low investments in the infrastructure necessary for efficient value chains, inadequate social protection. But there are emerging success stories of changing attitudes among the youths in undertaking agriculture as a business.[3] The export of agricultural commodities is the main source of ECOWAS external trade, in which about six billion Dollars (US$6b) is generated, or approximately 16.3% of the tangible and intangible commodities are exported from the region.[4,5]

Harnessing agricultural potentials in West Africa is essential for the reduction of the rate of poverty and the attainment of sustainable development.[6] The baseline for this study is on the argument that compared to other sectors of the West African economies; sustainable development will be attained quickly using agriculture as the head-lamp. This is because an increase in agricultural production raises rural households' income per-capita, which other sectors may not account for. However, sustainable development will be attained coupled with greater industrialisation and urbanisation, as agriculture provides the raw materials the industries need for production. This may in turn give rise to demand in industrial production.

It is seen that increased agricultural output and productivity tend to contribute substantially to an overall economic development of the country more than other sectors, therefore, this study posed that it will be rational and appropriate for West Africa to place greater emphasis on the development of the agricultural sector.[7,8,9] In addition, agricultural development is the way to go for West African countries in order to achieve sustainable development. It is observed from literature that "indeed sustainable development in the West African sub-region can only be practical through the total revitalization of our agricultural sector. This will drive the sector to produce food and fibres to feed our people at a rate faster than the birth-rate; yet reducing the death rate. The injection of

vigour into the agricultural sector will also fasten the creation of self-reliance, self-contentment and self-sufficiency which will be translated to national sufficiency".[10]

The export potentials of the agricultural commodities generate a reasonable level of revenue that the governments use in paying for the importation of final products, equipment in terms of capital and intermediate goods for industrial use and services. With respect to employment opportunities, the agricultural sector in ECOWAS remains the largest provider of labour with more than 60% of the region's active population engaged in it, despite the fact that the remuneration of the sector is less than that of other sectors in the economies.[11] In addition, agriculture is an essential determinant in the race of ending poverty at all levels and the achievement of food security by 2030.[2] A household who engages in farming adopts the methods within internal consumption, while those that live in cities (who are responsible for more than half of the region's total population) get almost all their food from the rural markets.[11] Currently, about 80% of the ECOWAS population's food requirements are met by regional produce, but in the next few years, the West African agricultural produce will have to contend with the huge increase in demand as a result of an upsurge in population growth. The Economic Community of West African States' (ECOWAS) population presently stands at 290 million people, and is projected to surpass 400 million by 2020, and 500 million by the year 2030.[11]

Despite progress in reducing the prevalence of extreme poverty (share of population living on less than $1.25 a day) in low and middle income countries, little progress has been made in reducing the number of people living on between $1.25 and $2.00 a day.[2] Furthermore, poverty persists, with recent estimates showing that about 2 billion people worldwide may be considered poor.[12] Numerous sources have shown that poverty is more prevalent in rural areas than urban areas of the developing world including the West African sub-region[13,14,15] showed significant growth in government spending per capita from 1980 to 2010, using an unbalanced panel dataset for 147 countries. Much of the growth is attributed to increase in spending per capita on education and health with rapid rate of increase in countries of both the developing and developed world. The most comprehensive estimates (based on household survey data supplemented with administrative data) are that 1.9 billion people throughout the developing world receive social assistance.[4,5]

Therefore, in the light of the foregoing, the objective of this paper is to examine the impact of agriculture as a stimulant for sustainable development in the Economic Community of West African States (ECOWAS). This is aimed at eliminating poverty by the year 2030. Thus, this paper is structured as follows; section two is the literature review and theoretical framework. Section three presents the methodology employed in this paper. The results and discussion are set out in section four, while section five presents the conclusion and recommendations of the study.

2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

The importance of sustainable development cannot be discussed in the West African sub-region without due regard to the growth in the agricultural sector. Agriculture is a major pathway to the economic growth and development of the West African sub-region. As pointed out in the literature, "the agricultural sector also generates foreign exchange through exports for the countries in the sub-region. Agriculture comprises of all aspects of human activities - being the art and act of the cultivation of land and production of plants and animals which creates an activity; and a web-chain through which social and economic needs are satisfied. Agriculture is the mainstay of economies in the world; little wonder why wise nations all over the globe give it a priority by developing and exploiting this sector for the maintenance of their crowded populations through the earning of revenue for development purposes; as well as employment which helps to reduce anti-social vices, crimes, corruption and other forms of indiscipline. These anti-social vices retard the growth of an economy and make the citizens of the country unproductive positively".[10,8]

[16] examined the impact of social grants on poverty reduction at the household level in Ghana; they employed the usage of well-structured questionnaires, focus group discussions and in-depth interviews in their study. The study found out that the Livelihood Empowerment against Poverty (LEAP) social grant has a positive impact on food consumption, frequency of utilisation of health care facilities and the school enrolment rate for children aged 6-13 in beneficiary households. The study recommended that the government should increase the cash amount, pay transfers regularly, link beneficiaries to existing complimentary services in the district, recruit more staff and provide in-service training opportunities for them. In line with [16,17] carried out an empirical study on the role of agriculture in the economic development of Nigeria. The study used trend analysis in form of historical and current perspectives as well as various descriptive methods to analyse the development of agriculture in Nigeria. The study proved that an in-depth research on the development of the agricultural sector is essential to the progress of the country. Furthermore, less emphasis was made in proffering solutions to the achievement of economic development through the tool of agriculture.

[18] carried out an empirical investigation pointing out that the agricultural sector has significant potentials for the transformation of the African economy. His study further acknowledged that most important public policies

in West Africa have been tailored towards food security, supply of agricultural raw materials needed by the manufacturing sector to provide adequate employment and income to farmers. The study recommended that credit facilities and extension services should be provided to the farmers in order to bring about price stabilization, and to achieve this agriculture should be made a priority. In the same vein, [19] investigated the relationship between rurality and poverty as well as the role they play in rural development and poverty reduction. It was argued that there was an historical mis-judgement against the primary sector which served as a foundation for anti-agricultural bias in public policy until the late 1980s. They concluded that the less developed countries (LDCs) still necessarily need agriculture as their starting point for rural development in comparison to the advanced countries.

In the study by [8], they examined the role of agriculture in the development of the Nigerian economy from 1970 to 2008 and employed the Johansen co-integration technique in the analysis of the data. The result from the study showed that there is no significant impact of the agricultural sector on economic development in Nigeria. Therefore, the study recommended that in order to develop the agricultural sector, the Nigerian government should invest in research and technology as this will help to increase agricultural productivity and the government should establish agricultural fund to finance and facilitate medium and large scale agricultural production which will in turn enhance employment, production for local consumption and for export. In a study by [20], they observed that for sustainable development to be witnessed there has to be adequate planning in the agricultural sector.

[21] examined the role of agriculture in the economic growth and poverty reduction in Tanzania from 1980 to 2014 using a descriptive analysis. The study found out that an increase in population (household size in rural areas) and poor public services in rural exacerbating poverty and accelerates shifting from agriculture to non-agricultural activities especially the educated youths. The study recommended that steps must be taken if the nation is to continue to pursue high level of achievement so that arable land with the favourable climate can be strategically used for food production to ensure availability of agricultural produce. [6] examined the effect of agricultural productivity on poverty reduction in Africa using the dynamic panel data approach and the System-GMM technique for the period 1991-2015. The results from this study revealed that the agricultural value added per worker contributes significantly to reducing poverty in Africa. The study recommended that part of the development programmes that are used to enhance agricultural productivity, should include strategies for accessing credit in order to boost the asset base of rural farmers for a large scale commercial production. In addition, appropriate macroeconomic policies and sound institutional framework need to be put in place in order to improve on the provision of social services and the provision of land used for farming. However, in order to obtain optimal output from farming, zoning type and size should be determined for "land use section" where zoning type is simplified into residential district, commercial district, industrial district and available land for agriculture. [22]

[23] examined agricultural technology, productivity and poverty in Madagascar. Spatially explicit dataset was employed in this study to link agricultural performance and rural poverty in Madagascar. The study found that agricultural production constitutes an important part of any strategy to reduce the high poverty and food insecurity rates currently prevalent in rural Madagascar. It has been observed that the youths in the African continent prefer 'white collar' jobs to getting engaged in the agricultural sector. This is due to the fact that crude implements are still been used predominantly to practice agriculture in the West African sub-region. This assertion was buttressed in the study by [24], their descriptive study examined youth migration, livelihood prospects and demographic dividends in rural northeast of South Africa. They found out that only 10% male youths were employed in the agricultural sector in 2000 and this reduced to 3% in 2012. Similarly, the percentage of female youths employed in the agricultural sector witnessed a reduction from 11% in 2000 to 6% in 2012. They observed that the remaining parts of the population in both years were employed in other sectors of the economy. The study recommended that for employment in agriculture to increase, more youths should be engaged in it and this would help reduce unemployment and reduce poverty.

It is observed from literature that increased employment, increased output which leads to increase in the revenue generated, increased per capita return, increased savings on the part of the farmers and population growth are factors of agricultural development. However, this study adopts the employment generated in the agricultural sector, savings and population growth as factors of agricultural development. [5] This serves as part of the motivation for carrying out this study.

This study focused on the ECOWAS region which is made up of fifteen (15) countries: five of which are English speaking countries (Ghana, Gambia, Liberia, Nigeria and Sierra Leone), nine are French speaking countries (Benin, Burkina Faso, Ivory Coast, Guinea, Guinea Bissau, Mali, Niger, Senegal and Togo) and Cape Verde which speak Portuguese. The study made use of secondary data sourced from the World Bank's World Development Indicators (2017), Country Policy and Institutional Assessment (2017), Gini index, the United Nations Education, Scientific and Cultural Organisations (2017) and International Labour Organisation (2017). The FAO study observed that the United Nations' quest for sustainable development by the year 2030 have been a great achievement as the number of people living in poverty has dropped from 1.9 billion in 1990 to 836 million in 2015, though this achievement is limited to the ECOWAS sub-region (FAO, 2017). Variables show that within

10 years, that is, the period under study (2007 to 2016), the poverty rate in ECOWAS accounts for more than 40% of the World's poverty rate (FAO, 2017). This is as shown in Figure 1.
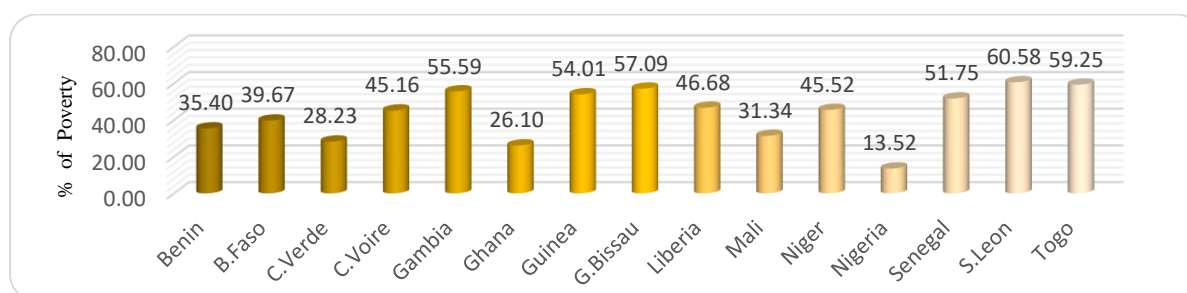
Figure 1: Average Rate of Poverty in ECOWAS Countries (2007-2016)
Source: Authors' Computation, 2018. **Note:** % poverty defined as number living on $1.25/day.

Figure 1 presents the average poverty rates across ECOWAS countries between 2007 and 2016. It could be seen that in this region, the rate of poverty is highest in Sierra Leone with poverty rate of 60.58%, Togo has poverty rate of 59.25%, Guinea Bissau 57.09, Gambia 55.59%, Guinea 45.0%, while Nigeria has a relatively low poverty rate of 13.52%. Though, SDG1 (eliminate poverty in all its forms) may be attained by the year 2030, as its rates globally fell from approximately 30% in 1990 to 12% in 2015; in terms of absolute population figures the extreme rate of poverty may not be eliminated, as it reduced from1.27 billion in 1990 to 0.75 billion in 2015. The greatest reduction occurred in countries in East Asia and South Asia, Europe and Americas; but, ECOWAS posed a different picture as the rate of poverty keeps increasing and is projected to be more by 2030 (FA0, 2017). However, a slight improvement will only be attained if policies such as social protection policies are changed in no distant time to reduce vulnerability.[25,26,27]

It is a known fact that unequal distribution of income makes the poor not to be linked to the growth process.[28,29] According to literature, nations with high rate of inequality need twice as more growth as nations with low rate of inequality to meet the poverty target of attaining SDG which is eliminating poverty.[30] Weak social protection has also weakened the reduction of poverty in ECOWAS as the highest rate of poverty is noticed among rural dwellers that depend on agriculture for survival. Social protection programmes has been proven to be one of the most effective weapons for fighting poverty and unproductive capacity of rural households who depends on agriculture.[31,32] Given the Sustainable Development Goal 1 and its target by 2030, the current state of poverty has it that approximately 836 million individuals are living in absolute poverty and in the less developed countries of the world, in any five people, at least one of them lives below the poverty line of $1.25 a day.[2] The largest number of the people who are living below the poverty line are from two main regions: 'Southern Asia and sub-Saharan Africa,' and it is observed that two out of five children aged five and below in these regions have insufficient height for their age due to under-nourishment.[2]

3. METHODOLOGY

Various theories have been developed in explaining the incidence of poverty. Among the theories reviewed, the model for this study adopted the Sustainable Livelihoods (SL) theory. The SL theory takes a wide-range model in explaining lack and particularly focused on the importance of weakness and limitation of the poor. It places interest on the net asset position rather than flows of income, and shocks (short-term impacts) rather than longer-term threats to income.,[33] Following the SL model, and with respect to this study, poverty is defined in relation to vulnerability or what makes the poor vulnerable.[34,35] In a broader term, poverty has been consequently defined to include income and non-income proportions of lack – including lack of income and other material means; lack of access to basic social services such as education, health and safe water; lack of personal security; and lack of empowerment to participate in the political process and in decisions that influence one's life.[36] The SL approach has provided a helpful structure in the study of livelihoods - welfare and poverty issues to derive relevant policy inferences.

The major advantage of the SL theory is that its attention is focused on individuals and their livelihoods instead of resources and their exhaustion.[37] Therefore, the model for this study was adopted from the empirical work of [6] and the model assumed a linear relationship of the poverty (proxy for Sustainable Development Goal 1) determinants in West Africa which is specified in implicit form as:

$$Pov_t = f (Ava_t, Empagric_t, Literr_t, Ineq_t, Popgr_t, Gds_t) \qquad (1)$$

Assuming that a non-linear relationship exists among the endogenous and the exogenous variables, the explicit form of equation (1) will be:

$$Pov_t = A.Ava_t{}^{\alpha 1}.Empagric_t{}^{\alpha 2}.Literr_t{}^{\alpha 3}.Ineq_t{}^{\alpha 4}.Popgr_t{}^{\alpha 5}.Gds_t{}^{\alpha 6} \tag{2}$$

The double log model is taken to linearise equation (2) as presented in equation (3). The model is logged to reduce the incidence of multicollinearity and other issues that may lead to spurious result, as evident in[38] Ejemeyovwi, Osabuohien and Osabohien (2018).

Therefore, log linearizing equation (2), it yields equation (3):

$$logpov_{it} = \alpha_0 + \alpha_1 log\ ava_{it-1} + \alpha_2 logEmpaagric_{it} + \alpha_3 logLiterr_{it} + \alpha_4 logIneq_{it} + \alpha_5 logPopgr_{it} + \alpha_6 Gds_{it} + \mu_{it.} \tag{3}$$
$$\quad\quad +\quad\quad\quad\quad +\quad\quad\quad\quad -\quad\quad\quad\quad +\quad\quad\quad\quad -\quad\quad\quad\quad -$$

Where; **Pov** stands for poverty which is used to capture SGD1, A**va** agriculture value added, E**mpagric** employment in agriculture, **Literr** literacy rate, I**neq** inequality, **Popogr** population growth rate, and **Gds** gross domestic savings (see Appendix 1). And the '*i*'and '*t*' represent countries and time respectively; Yt_{-1} represents the lagged dependent variable, to control for the omitted variable bias, while the $\alpha_1 ... \alpha_6$ are regression coefficients. The *apriori* expectations are viz; agriculture value added, employment in agriculture, population growth rate and inequality are positively related to poverty while inequality and gross domestic savings are negatively related to poverty.

Hence, given that SDG1 proxied by poverty is a column vector represented as:

$$\begin{pmatrix} dpr \\ psav \\ invst \end{pmatrix}_{it} = \alpha_0 + \alpha_1 empagric_{it} + \alpha_2 literr_{it} + \alpha_3 \alpha ineq_{it} + \alpha_4 popgr_{it} + \alpha_5 gds_{it} + \mu_{it} \tag{4}$$

where: dpr means dependency rate, psav means political stability and absence of violence, invst means investment, while other variables remains as defined (see Table 2).

In GMM method, the predetermined and endogenous variables are instrumented by their appropriate lags, to avoid introducing a spurious correlation between these variables and the error term.[38,6]
Given the growth regression for *N* countries and *T* time periods represented as:
$$\Delta Y_{i,t} = \Upsilon yi, t-1 + \sum_{j=1}^{k} \beta \alpha_j x_{j,i,t-1} + \alpha_t + \mu_t - (5)$$

where the study indexed time as t and i as countries. Likewise, $\Delta Y_{i,t}$ is the average growth rate, representing the logarithm of initial level of population, $x_{j,i,t-1}$ are the k additional regressors and α_t is the constant term which tends to vary with time. The errors μ_t are decomposed into time invariant country specific effects, μ_i, and white noise, $e_{i,t}$ such that: $\mu_{it} = \mu_t + e_{i,t}$. Instrumental variable estimation and the static panel data model approach may produce inconsistent results, and the study adopts the Generalised Method of Moment approach. The GMM specification can be illustrated as thus:

$$\Delta Y_{i,t} - \Delta Y_{i,t-1} = \Upsilon(Y_{i,t-1} - Y_{i,t-2}) + \sum_{j=1}^{k} \beta_j(x_{j,i,t} - x_{j,i,t-1}) + \alpha_t - \alpha_{t-1}) + e_{i,t} - e_{i,t-1} - -$$
$$- -(6)$$

As noticed, the regressors may also be correlated with the error term, such that $Y_{i,t-1}$ is correlated with $e_{i,t-1}$ and $x_{j,i,t-1}$ may be correlated with $e_{i,t-1}$. This problem is solved by adopting lagged observations of the regressors as instruments, similar to Ogundipe et al. (2016).

To the best of the knowledge of the authors, no study had examined the impact of agricultural employment on sustainable development. This study contributes to knowledge in this area, using the Generalised Method of Moments (GMM). The choice of the use of the GMM technique stemmed from the fact that the GMM technique estimates the model parameters directly from the moment conditions that are imposed by the model. These conditions can be linear in the parameters or nonlinear. This is used because of the possibility of endogeneity and omitted variable bias. The variables that involve agriculture may be endogenous and usually have limited time variation. Thus, the GMM helps solving the problem of endogeneity and omitted variable bias, this makes the results of the estimations to be better.[38,39,40]

4. RESULTS AND DISCUSSION

The results discussed in this section are based on the analysis of the data employed for this study. The starting point of the data analysis is the summary statistic of variables as shown in Appendix 2. The results further showed

that the explanatory variables have a significant relationship with poverty. This supported the *apriori* expectations of the variables which suggested that agriculture value added, employment in agriculture, inequality; gross domestic savings, population growth and education (literacy rate) are expected to have significant influence on poverty.

As pointed out earlier in this study, the reason for the use of GMM technique is for the control of omitted variable bias and model endogeneity. Also, the GMM estimator is easily observable when the units of the dynamic panel model are relatively larger than the periods under study.[41,42,43] However, the traditional GMM estimator has over time been proved to have poor finite sample properties, in this regard, the series tends to be extremely persistent.[44] In these circumstances, the lagged levels of the series are only weakly correlated with subsequent first differences; thus, leading to weak instruments for the first-differenced equations.[41,44]demonstrate that the SGMM approach - by including extra moment restrictions - permits lagged first differences to be used as instruments in the levels equations, and this corrects for any bias that would emerge using the standard GMM estimator. Care was taken to ensure that GMM proliferation of instruments that may outfit endogenous variables are controlled, and it was observed that the model passed both the test for instrument validity (Sargan AR(1) and AR (2)) and the test for second-order serial correlation.[42] The results from the SGMM estimations are presented in Appendix 3

In West Africa and other regions of developing countries, poverty remains the main barrier to population transition in response to food supply and the best strategy of eliminating poverty is to enforce necessary changes in the society.[45] This necessary change, if extended to agriculture, will have a greater reduction in the poverty rate. This is confirmed from the GMM results presented in Table 4, which showed that agriculture value added and employment in agriculture are both statistically significant in explaining poverty in the ECOWAS sub-region. The increase in agricultural employment enhances the production capacity of the sector and reduces poverty. As increase in agriculture value added will help in reducing the rate of poverty by 35.55%, 76.82%, 48.85% and 53.67% respectively (see Table 4; column 1 at lag 2 2; column 2 at lag 2 3; column 3 at lag 3 1 and column 4 at lag 3 2 respectively). In addition, the potentials in the agricultural sector if unveiled through employment has the capacity of reducing poverty by approximately 22.03%, 27.18%, 15.28% and 16.99% respectively (see Table 4; column 1 at lag 2 2; column 2 at lag 2 3; column 3 at lag 3 1 and column 4 at lag 3 2 respectively).

This study also found that one of the root causes of poverty in the ECOWAS sub-region could be as a result of the rate of inequality in the sub-region, as the estimated result showed that if the rate of inequality increase by 1% it poses a danger of increasing poverty by 55.3%, 49.43%, 9.21% and 3.3% respectively (see Table 4). On the other hand, the literacy rate is also statistically significant in explaining poverty and is negatively related to poverty, that is, the higher the literacy rate, the lower the rate of poverty. However, this supports the theoretical underpinning that a higher literacy rate helps reduce the rate of poverty (by 14.92%, 8.85%, 7.40% and 0.11% respectively). In this study, the authors used different lag levels (lag 2 2, lag 2 3, and lag 3 1) to run the GMM method, this is because, authors selected lags that gave best estimates from the regression analysis.

This study supports the findings of [46] who examined thirty-six (36) sub-Saharan African countries; they observed that the Malthusian theory of population holds for population-agriculture-employment relationship. [46] argued that in spite of the fact that the growing population is being provided with food now, a time will come in the nearest future when population explosion would completely ruin the sufficient food supplies; they also argued that the less developed countries (LDCs) are trapped in a vicious cycle of poverty. The birth rate has the tendency to be high due to the high rate of poverty, and so we have a continued high proportion of the population that will continually live in poverty.[37,35,47] This postulation is one of the reasons justifying the inclusion of population growth rate in equation 1 and as argued in the Solow Growth model. From the results in this study, it showed that an increase in the population growth rate results in an increase in the rate of poverty (this is because more people tends to chase few resources) by approximately 93.4%, 45.9%, 10.1% and 22.6% respectively as shown in Table 4 (see column 1 at lag 2 2; column 2 at lag 2 3; column 3 at lag 3 1 and column 4 at lag 3 2.). In the same vein, gross domestic savings has a role to play in reducing poverty; this is evident from the results that showed that an increase in households' propensity to save reduces poverty by 24.10%, 11.15% 10.11% and 77.11% respectively.

From the results of this study, the following policy implications are crucial for the countries in the ECOWAS sub-region to consider and possibly implement. First, for poverty to be eliminated by the year 2030 in the ECOWAS sub-region agricultural produce needs to increase and one of the ways to achieve this is to increase the employment generated in the agricultural sector. Second, the population growth rate in these ECOWAS countries needs to reduce since the rate of food production does not match the increase in the population in these countries. To this end, population control measures need to be put in place. Third, the wide gap between the rich and the poor in these ECOWAS countries need to be reduced by reducing the rate of inequality via income and tax measures. Fourth, the governments of the ECOWAS countries should educate the farmers since the more educated the farmers are, the more enlightened they will be in making use of mechanised implements in agricultural practice, and the higher the level of output and this will help reduce poverty via the increment in their levels of income. Lastly, the governments of these ECOWAS countries should reduce the importation of food

items in order to reduce balance of payments deficit (that is, a situation where imports exceed exports). The volume of imports in these countries is high already because of the fact that they import technology and industrial goods, adding the importation of agricultural produce would further worsen the balance of payments position in these countries.

5. CONCLUSION

The West African countries may be able to exchange importation of agricultural commodities for poverty reduction; these nations will be at a relative advantage when compared with their counterparts. But several nations, including some of the continent's largest, will not be able to feed their citizens with importation of food alone, considering the adverse effect of deficit balance in their balance of payments accounts. A country like Cape Verde among other ECOWAS countries, for instance, will continue to depend heavily on importation of its food needs. Thus, agriculture serves as an avenue for the poor to increase their earnings from their engagement in revenue generating agric-oriented activities. Whether or not the poor will make use of these opportunities depends on their level of education (literacy level), on their access to credit and their savings habit as well as on whether they are excluded by social custom or sanctions from government from income-earning activities (such as women shut out from credit markets). The measures to increase the capital available to the poor (human, financial, physical, natural and social inclusion) may consequently be huge surpluses in terms of their ability of lifting them off the poverty trap. Thus, the attainment of the Sustainable Development Goals (SDGs) by 2030 is feasible for the ECOWAS countries if the governments of these countries make concerted effort to actualise them. In a nutshell, SDG1 which is elimination of poverty can only be achieved if agricultural output is increased which would increase the income of the farmers and reduce poverty amongst them.

Therefore, based on the findings of this study, the following recommendations are made: First, agriculture (proxied by agriculture value added) is significant at 1% level and negatively related to poverty. This means that the higher the rate of agricultural output, the lower the rate of poverty. However, this supports the theoretical belief that agriculture has a negative relationship with poverty rate, that is, the higher the agricultural output, the lower the rate of poverty. Therefore, this study recommends that the ECOWAS countries need to focus more on agriculture so that they can be exporters of cash crops that will generate foreign exchange for their economies and increase savings that can be used to alleviate and totally eliminate poverty among the people. Second, the study also found out that employment in agriculture is also significant and is negatively related to poverty, that is, the higher the rate of employment in agriculture, the lower the rate of poverty. However, this supports the theoretical underpinning that a higher level of employment in agriculture should help reduce the rate of poverty. Though, most of the people engaged in agriculture in the ECOWAS countries are predominantly found in the rural areas / communities and majority of them still use crude implements with low productivity as the attendant outcome.

The governments of ECOWAS countries should encourage more people to practice agriculture via the provision of credits and extension services for persons in the urban areas so they can engage in mechanized farming. Third, the study found out that literacy rate is significant at 5% level and is negatively related with poverty, that is, the higher the literacy rate, the lower the rate of poverty. However, this supports the theoretical underpinning that a higher literacy rate should help reduce the rate of poverty. Therefore, this study recommends that the farmers should be given both formal and informal education that will make them know the rudiments and use of mechanized implements. Furthermore, this study recommends that the governments of ECOWAS countries should put in place population control measures such as birth control/family planning, so as to reduce the population and bring food production at *par* with the population. Lastly, governments of ECOWAS countries should invest their savings in providing social and infrastructural facilities for the populace to make the practice of agriculture a profitable and enjoyable venture, this way more people will want to be engaged in agriculture.

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Appendices

Appendix 1
Variables Definition and Source of Data

Variable Name	Identifier	Source of Data	Measurement and Definition
Poverty	Pov	WDI, 2017	This refers to the state of being extremely poor, not able to meet one's basic needs. This is proxied by poverty head count (number of individuals that lives below the poverty line; the ratio at national poverty line % of total population).
Agriculture Valued Added	Ava	WDI, 2017	This refers to the net output of agriculture which is obtained from all output from forestry, fishing, including hunting and crop production. Agriculture value added is measured as % of GDP.
Employment in Agriculture	Empagric	ILO, 2017	Employment in agriculture refers to labour force in agriculture, that is, the total number of people (male and female) who is engaged in the sector and it was measured as % of total employment(Dahiya,2012)
Inequality	Ineq	Gini Index, 2017	The Gini index measures statistically income distribution (or, in some instances, consumption expenditure) among households in an economy in order to ascertain its divergence from a normally equal distribution.
Literacy Rate	Literr	UNESCO, 2017	Literacy rate refers to the total percent of the population who can read and write. The literacy rate in this study is assumed to be % of people ages 15 and above that is educated.
Population Growth	Popgr	WDI, 2017	This is the rate at which the number of individuals in a population increases in a given time period, expressed as a fraction of the initial population. . It is the annual growth in percentage..

Gross Domestic Savings	Gds	WDI, 2017	This is the gross domestic product minus final consumption expenditure. It is expressed as a percentage of GDP measured in current US$.

Source: Authors' Compilation, 2018. **Note**: WDI: World Development Indicators; ILO: international labour organisation. UNESCO: United Nations Educational, Scientific, and Cultural Organisation.

Appendix 2
Summary Statistics of the Variables

Variable	Mean	Standard Deviation	Minimum	Maximum
Pov	47.4200	12.0570	23.1000	88.5000
Ava	30.4347	14.8200	-4.0504	65.5979
Emagric	52.5111	14.9939	22.0000	78.4928
Ineq	42.3585	5.42568	31.4500	54.1400
Literr	43.9926	17.1089	21.8229	86.8375
Popgr	2.7082	0.673884	0.5276	4.1824
Gds	5.1509	1.9810	-1.3009	1.5411

4.
Source: Authors' Computation using STATA 13, 2018.

Appendix 3: SGMM Results (Dependent Variable: Poverty)

	GMM result at lag 2 2	GMM result at lag 2 3)	GMM result at lag 3 1	GMM result lag 3 2
Poverty(-1)	0.35462* [0.0701] (0.000)	0.7682* [0.0357] (0.000)	0.4885* [0.0523] (0.000)	0.5367* [0.0514] (0.000)
Agriculture value added	-0.220** [0.0739] (0.003)	-0.0272** [0.0118] (0.021)	-0.1528 [0.0505] (0.002)	-0.1699 [0.0533] (0.001)
Employment in agriculture	-0.1192 [0.0772] (0.123)	-0.1336* [0.0320] (0.000)	-0.0949 [0.0573] (0.098)	-0.1449** [0.0673] 0.031
Inequality	0.553 [3.5296] (0.117)	0.4943* [0.0832] (0.000)	0.0921 [.1800] (0.609)	0.03312 [0.1959] (0.866)
Literacy Rate	-0.1492 [0.0054] (0.400)	-0.0485 [0.0363] (0.182)	-0.0740 [0.07221] (0.305)	-0.0011 [0.087] (0.990)
Population growth rate	0.9341 [4.5002] (0.514)	0.4587* [0.0935] (0.000)	0.10 11** [2.1410] (0.007)	0.2257 [2.9392] (0.442)
Gross domestic savings	-0.2410 [13.719] (0.232)	-0.01115 [0.0073] (0.129)	-0.1011 [2.1410] (0.670)	-0.7711 [1.9010] (0.884)
Constant	54.8257* [13.719] (0.000)	2.1736* [0.379] (0.000)	28.9709* [10.663] (0.007)	13.45287 [11.579] (0.245)
AR (1)	0.950	1.25	0.105	0.850
AR (2)	0.796	0.95	0.103	0.923
Sargan Test	0.10	40.99	29.33	0.25
Prob> F	(0.000)*	(0.000)*	0.000*	0.000*

Number of instruments	8	11	14	7
Number of groups	14	19	25	12

Source: Authors' Computation using STATA 13, 2018. *Note: The values in the parenthesis '()' [] are the probability values and the standard errors. *, *, and *** denotes that the coefficients are significant at 1%, 5% and 10%, respectively.*