

Does population growth have any impact on economic growth?: Evidence from Tanzania.

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Abstract— *Effects of population growth on economic growth in Tanzania is presented to two specific objectives notably the direction and relative influence of population growth on economic growth and the existence of long-run relationship between population growth and economic growth are examined. Annual time series data from 1980 to 2019 together with Autoregressive distributed lag model which ascertain the direction and relative influence of population growth on economic growth are used. Granger causality test to ascertain the causality between population growth and economic growth is observed. Co-integration test to determine the existence of long-run relationship between population growth and economic growth is applied. Findings reveals that population growth, gross capital formation, government expenditure, total fertility rate, life expectancy, dependency ratio, and foreign direct investment net inflow have negative impact towards economic growth while trade openness has a positive impact towards economic growth. This paper shows that there is a negative relationship between population growth and economic growth in Tanzania. Therefore, though population growth has a negative relationship on economic growth the analysis recommends that, if population growth is well managed it can give positive outcomes towards economic growth. The government should be advised to emphasize on family planning policy towards population growth management. Trade openness has a positive impact towards economic growth hence this paper recommends that its advancement by opening up doors inside and outside the country will increase the accessibility of goods and services providing efficiency in the allocation of resources. Trade openness also improves foreign direct investment through the transfer of new technology.*

Keywords— *Population growth, Economic growth, Tanzania.*

I. INTRODUCTION

Economic growth is the increase of the number of goods and services that are produced from a country over time, is a fundamental macroeconomic policy objective which countries all over the world continue to strive to achieve (Puteraet.al, 2011). Economic growth is one of the most macro-economic variables that indicate economic size of a country. It is a reflection of people's lives, welfare, volume and speed of economic activities. Societies associate economic growth with bigger reap benefits. A country with high economic growth is expected to have high income, better education, increased life expectancy, improved government finances, and reduced poverty. One of the

crucial macro-economic variables said to affect significantly economic growth is population growth.

Population is an important resource for development, it is a resource for labour supply for production as well as consumption of various products hence the size of a population is one of the important parameters of economic growth (2002 pop census). Population growth is driven mostly by high birth rates, low death rates and high life expectancy. From the last census of 2012, the crude birth rate of Tanzania is 42 births per 1000 population while the crude death rate is 9.3 deaths per 1000 persons which are clear that birth rate exceeds death rate. On the other hand, the life expectancy is 61.8 years.

Population growth is sometimes influenced by religious and cultural factors. In religious which are highly dominating in Tanzania like Christianity and Muslim who believes that to have a child is a blessing from God and do not give a hand to population control measures like the use of contraceptives such as condoms which is highly prohibited (Puteraet.al, 2011) This high population growth has three major influence factors; first is the food production distribution food tends to increase life expectancy of a person on earth if food is highly and enough accumulated since it's the main source also the basic need for a man to live.

According to Food and Agriculture Organization (FAO 2019) for the past 10 years production of food has increased by 24% worldwide whereby this was not evenly distributed throughout the world as in Tanzania food production decreased while population increased by 11.1%; Second is the improvement in public health. The concern of surviving daily living in meeting basic needs like food, water and housing, the accessibility of safe drinking water has reduced incidence on epidemic diseases like cholera also housing condition and the pressure of providing adequate housing increases as the population grows. Conquest of diseases; health sector has improved whereby the number of doctors and nurses has rapidly increase overtime of which at this due time one physician is attending 1000 people per day (World Bank 2020). A big impact has shown to save many lives that were caused by a deadly disease.

Tanzania has been conducting different census in order to know the total number of her citizens and their wellbeing. In 1967 Tanzania's total population was 12.3 million and it has been increasing each year. For example, 1988 to 2002, the total population increase was 11.3 million from 23.1m to 34.4m, equal to an increase of 49%. The 2012 Tanzania census reported the population of about 44million which had increased to 30% from the previous census and which was projected to reach 56million in 2019. Hence, by reaching 2025 the population of Tanzania is projected to be 70.1 million; this estimation makes Tanzania being a leading country in East Africa and the 6th in Africa (United nations 2019).

The contribution of population growth towards economic growth is explained by different scholars in different ways. Afzal (2009) associate high population growth as being adversely affecting economic growth. However, some attach high population growth with positive effect to economic growth, notably (Kuznets, 1967, Thuku et al (2013). It is observed that some of the developed countries have high population, namely China, India, United states, Brazil etc. and there are also developing countries with

high population growth namely Nigeria, Ethiopia, DRC etc.

The general trend of economic growth in Tanzania has been improving overtime since 1961 to 2020. For example, from 1967-1985 which was the first regime of the government, the GDP Per-capita was reported to be at an average of \$190.3(1,815.4Tsh) per individual which was equivalent to the economic growth rate of 3.1%. In the second phase, from 1986-2005 It was reported to reach \$205.8(46,722Tsh) which represents 3% of economic growth rate. The third phase of 1995 to 2005 the GDP per-capita was reported to be \$311.2(277,179.4Tsh) whereby 5.7% was reported as the economic growth, from 2005 to 2015 GDP per-capita of Tanzania was \$622(979,519.9Tsh) which indicate economic growth of 6.3%. In the current regime of 2015 to 2020 the GDP per-capita has increased to \$1,063.3 (2,386,826.1Tsh) as a growth of 6.9%.

Tanzania has been struggling to increase its economy for many years and it has passed through many strategies. The most known ever implemented strategies are National strategy for growth and reduction of poverty (2005/2006-2010/2011), the second National strategy for growth and reduction of poverty (2010/2011-2014/2015), the introduction of EFDs (2010), and Kilimo Kwanza (2005).

National strategy for growth and reduction of poverty (NSGRP) known as MKUKUTA for mainland (2005/2006-2010/2011) and MKUZA for Zanzibar (2006/2007-2010/2011) was introduced with an aim of reducing income povertyand economic growth, then the government came up with another generation poverty reduction strategy known as MKUKUTA II and MKUZA II (2010/2011-2014/2015) to enhance the first strategy

Also, the government has made some efforts on the use of Electronic Fiscal Devices (EFD's). EFD machines were introduced by Tanzania Revenue Authority (TRA) in 2010- subsidiary legislation, Government notice No 192 published on May 28, 2010 with the main aim on making well sales records, to reduce tax collection costs and also helping traders to go with value added tax (VAT) regulations. Through the introduction and a lot of emphasis the government has put on the use of EFD's the economy has increased each year.

II. METHODOLOGY

Tests and Model Undertaken

Time series data from World development indicators (WDI) from 1980-2019 were processed by using STATA while descriptive analysis method was used and also undertook a number of tests before applying the Autoregressive distributed lag model.

Unit Root Test

This test is mostly used in the time series data since many macroeconomic time series data are not stationary. This test is also used so as to avoid a spurious regression. These stationarity tests included: Philip-Peron test (PP) and Dickey Fuller test (DF).

The hypotheses are

H₀: The time series data variable is non-stationary.

H₁: The time series data variable is stationary.

The decision criteria, if p-value calculated is lower than 5% level of significance which was chosen to be used in this study the null hypothesis is rejected and accept the alternative hypothesis.

Co-Integration Test

This test was undertaken to ascertain whether there is a long-run relationship between dependent variable and independent variables used in the study, the test was more preferred in this study because it gave consistent estimates. The bound testing technique was used.

The hypotheses are:

H₀: There is no long-run relationship/ no co-integration among variables.

H₁: There is long-run relationship/ co-integration among variables.

F- Calculated is compared with lower bound value and upper bound value of the pesaran table of critical values.

The decision criteria, if F- statistic is less than the lower bound value, the null hypothesis is accepted, if F-statistic is between the lower bound value and the upper bound value that is inconclusive and if F- statistic is greater than the upper bound value, the null hypothesis is rejected.

Autoregressive Distributed Lag Model (ARDL)

This method was developed by Pesaran et al (1998) and was used in this paper to measure the direction and relative influence of independent variables against the dependent variable. This model uses a combination of endogenous and exogenous variables; it contains the current variables and the lagged variable of the dependent variable.

The generalized ARDL (p, q) model is specified as

$$Y_t = \gamma_{0i} + \sum_{i=1}^p \delta_i Y_{t-1} + \sum_{i=0}^q \beta_i X_{t-i} + \epsilon_{it}$$

Where by

γ denotes Constant

δ and β denote coefficients

Y_t denotes a vector

X_t' are the variables

$i= 1, \dots, k$; p, q are optimal lag orders

ϵ_{it} is a vector of the error term

Decision criteria, if p-value is greater than 5% significant level and the t-ratio is higher than |2|, then that variable is insignificant.

Granger causality Test

This test was used to ascertain the causality between population growth and economic growth, if population growth causes economic growth or economic growth causes population growth or population growth and economic growth cause each other the pairwise granger causality approach was employed.

The hypotheses are:

H₀: Lagged (4 lagged) population growth does not influence economic growth.

H₁: Lagged (4lagged) population growth influences economic growth.

Decision criteria: If the prob>F is bigger than 5 percent level of significance then, the null hypothesis is accepted and if the prob> F is less than 5 percent level of significance the null hypothesis is rejected.

III. RESULTS

ARDL Model

This model was used to ascertain the direction and relative influence of population growth on economic growth. The following were the ARDL results.

Table 1: ARDL Results

Variable	Coefficient	P- Value	T- Ratio
d1gdpr	-0.596336	0.119	-1.78
d3popg	-14.97174	0.466	-0.77
d5tfr	68.13625	0.630	0.50
d7lnle	387.3233	0.684	0.42
d1fdi	0.19141	0.594	0.56
d1gvte	0.04824	0.906	0.12
d1gcf	-0.01502	0.913	-0.11

d1dr	-1.01413	0.667	-0.45
To	-0.10071	0.015	-3.20
Constant	0.66336	-	-

R- squared =0.8026

F-stat F (23, 7) =1.24

Prob> F =0.4107

The R-squared shown that, about 80.26% of deviation in the dependent variable could be described by independent variable. The probability of F-statistic was 0.4107 which was greater than 5 percent level of significance.

Empirical Model

The following was the empirical model after the estimations from the results obtained and shown in the Table 1 above

$$d1GDP_t = 0.66336 - 14.97174d3POPG_t - 0.01502d1GCF_t - 1.01413d1DR_t + 68.13625d5TFR_t + 387.3233d7lnLE_t - 0.10071TO_t + 0.19141d1FDI_t + 0.04824d1GVTE_t + \epsilon$$

Population Growth

From Table 1, p-value of 0.466 is higher than 5% level of significance; hence population growth is not significant in the short-run. The coefficient implies that population growth has an inverse direction on economic growth and does not influence economic growth positively. If population growth was to increase at 1% the GDP growth was to decrease by 14.97174 in the short-run. These results show a negative relationship between population growth and economic growth which is similar to Dao (2012) who concluded an opposite connection between population growth and economic growth. Also, Afzal (2009) from his empirical model reported a negative relationship between population growth and economic growth which is also, the same as in Anudjo (2015).

Total Fertility Rate

The value of fertility rate at all lags were greater than 5% significant level hence fertility rate was not significant in short-run. The coefficient is 68.13625 which indicate that if the fertility rate is to increase at 1% the GDP growth was to increase by 68.13625 in the short-run, hence total fertility rate has a negative influence towards economic growth. These results show an adverse direction between total fertility rate and economic growth and they match with those of Li (2016) who also concluded that total fertility rate has negative effect on economic growth.

Life Expectancy

The empirical results show that, life expectancy had a positive influence towards economic growth; if life expectancy was to increase at 1% then GDP was to increase at 387.3233 in the short-run. It also implies that at 5 percent level of significance life expectancy was not significant. When life expectancy increases can cause high dependency ratio on the people aged above 65. This result is opposing that if life expectancy increases then there could be a decrease in Tanzania’s economic growth which is similar to Li (2016) who also concluded an increase in life expectancy cause a decrease in economic growth which is an inverse direction.

Foreign Direct Investment Net Inflow

The t-value is 0.56 which indicates that foreign direct investment net inflow is insignificant in the short-run. The coefficient shown that, the GDP growth was to increase at 0.19141 when foreign direct investment net inflow rises at 1% in the short-run. This result shows a positive connection between foreign direct investment net inflow and economic growth, which is similar to Mawugnon & Qiang (2011) who claimed that foreign direct investment net inflow has a positive effect towards economic growth.

Government Expenditure

From the empirical results which imply a positive influence of the government expenditure on economic growth. The p-value indicates that, government expenditure is insignificant in the short-run. The coefficient is 0.04824 which shown that the GDP growth was to increase at 0.04824 when government expenditure rises at 1% in the short-run. All these conclude that there is a positive impact of government expenditure on economic growth. According to Jiranyakul, (2013) there is no co-integration between government expenditure and economic growth. Government expenditure influences private sector investment and facilitates education and health.

Gross Capital Formation

The p-value is 0.913>0.05 which indicates that gross capital formation is insignificant in the short-run. The coefficient shown that, the GDP growth was to decrease at 0.01502 when gross capital formation rises at 1% in the short-run. This shown that, population growth had a different direction on economic growth. According to Anudjo (2015) gross capital formation was not statistically significant but shows a positive relationship with economic

growth. Li (2016) concludes that, there exists a positive impact between gross capital formation and economic growth

Dependency Ratio

From the ARDL model results; the p-value of dependency ratio at all lags is greater than 5% significance level hence, dependency ratio is not significant in short-run. If the dependency ratio was to increase at 1% the GDP growth was to decrease by 1.01413 in the short-run. When population increases, the dependent population also increases. People aged 15 years to 64 years are the providers to the dependent population who are aged below 15 years and above 64 years. These results also match with those of Afzal, (2009) and Anudjo (2015).

Trade Openness

From the ARDL results, trade openness is the only variable that had a positive relationship with economic growth in Tanzania. As the p-value is 0.015<0.05 which points out that trade openness is significant in short-run. The coefficient is -0.10071 which indicates that if trade

openness is to increase at 1% the GDP growth was to decrease by 0.10071 in the short-run. Trade creates a room for foreign investment and also increases gross capital formation, the results shown that trade openness had a positive relationship with economic growth, these are in line with the results observed by Silajdzic & Mehic (2018).

Generally, this paper shows that population growth, fertility rate, government expenditure, foreign direct investment net inflow, life expectancy, dependency ratio and gross capital formation have a negative direction on economic growth, while only trade openness has a positive direction on economic growth. Furthermore, basing on the research findings trade openness is the only variable which has a long-run and short-run relationship with the dependent variable. Hence, there is negative relationship between population growth and economic growth.

Co-integration Test.

This test was undertaken to ascertain if there is a long-run relationship between dependent variable and independent variables used in the study

Table 2: Results of Bound Testing for Co-Integration

	[I_0] L_1	[I_1] L_1	[I_0] L_05	[I_1] L_05	[I_0] L_025	[I_1] L_025	[I_0] L_01	[I_1] L_01
K=8	1.95	3.06	2.22	3.39	2.48	3.70	2.79	4.10

- [I_0] presents lower bound class
- [I_1] presents upper bound class
- L_1 presents 10% level of significance
- L_05 presents 5% significance level
- L_025 presents 2.5% significance level
- L_01 present 1% significance level

From the decision criteria, if F- statistic is less than the lower bound value, the null hypothesis is accepted, if F- statistic is between the lower bound value and the upper bound value that is inconclusive and if F- statistic is greater than the upper bound value, the null hypothesis is rejected.

Therefore, the F-statistic is 2.176 which is less to the upper bound test at significance level of 5% hence, indicates that

there is no co-integration and there is no long-run relationship between the dependent variable and the independent variables. In this case, the R-squared of 0.9519 indicates that about 95.19% of the variation in the dependent variable (GDP_{Pr}) can be described by the independent variables. Due to that ARDL model is used to find short-run coefficients.

Granger Causality Test

This test was employed to check if population growth causes economic growth or economic growth causes population growth or population growth and economic growth cause each other, the pairwise granger causality approach was employed.

Table 3: Granger Causality Wald Tests

Equation	F	df	df r	Prob> F
Population growth does not influence economic growth	2.6478	4	27	0.0551
	2.6478	4	27	0.0551
Economic growth does not influence population growth	5.4976	4	27	0.0023
	5.4976	4	27	0.0023

From the decision criteria that if the prob>F is bigger than 5 percent level of significance then, the null hypothesis is accepted and if the prob> F is less than 5 percent level of significance the null hypothesis is rejected.

Therefore Table 3 above shows that after the 4 lagged, population growth can not cause economic growth since the Prob> F= 0.0551 which is greater than 5% significance level, hence population growth has a negative influence towards economic growth while economic growth can cause population growth. When we change the number of lags the results change a lot, so lag is a very important factor for any outcome. This paper used the fourth lag to get good assessment.

Generally, population growth can adversely influence economic growth which is the opposite on economic growth.

IV. Conclusion

Basing on the research findings trade openness is the only variable which has a long-run and short-run relationship with the dependent variable; hence there is no long-run relationship between variables. Therefore, this paper concludes that population growth has a negative impact on economic growth in Tanzania.

REFERENCES

- [1] Acemoglu, D., & Johnson, S. (2007). Disease and development: the effect of life expectancy on economic growth. *Journal of political Economy*, 115(6), 925-985.
- [2] Afzal, M.(2009). Population growth and economic development in Pakistan. *The OpenDemographyJournal*, 2(1), 1-7
- [3] Afzal, M., Farooq, M. S., Ahmad, H. K., Begum, I., &Quddus, M. A. (2010). Relationship between school education and economic growth in Pakistan: ARDL bounds testing approach to cointegration. *Pakistan Economic and Social Review*, 39-60.
- [4] Aidi, H. O., Emecheta,C., &Ngwudiobu, I. M. (2016). Population dynamics and economicgrowth in Nigeria. *Journal of Economics and Sustainable Development*, 4(2), 59-66,www.ijassh.com
- [5] Anudjo, E. Y. (2015). *The Population Growth-Economic Growth Nexus: New Evidence from Ghana* (Doctoral dissertation, University of Ghana).
- [6] Bidisha, S. H., Abdullah, S. M., Siddiqua, S., & Islam, M. M. (2020). How Does Dependency Ratio Affect Economic Growth In the Long Run? Evidence from Selected Asian Countries. *The Journal of Developing Areas*, 54(2).
- [7] Boucekkine, R., Diene, B., &Azomahou, T. (2007). *A closer look at the relationship between life expectancy and economic growth* (No.Université Louis Pasteur).University of Glasgow, Department of Economics.
- [8] Cannan, E. (1927). *London essays in economics: in honour of Edwin Cannan* (No. 92). G. Routledge.
- [9] Dao, M. Q. (2012). Population and economic growth in developing countries. *International Journal of Academic Research in Business and Social Sciences*, 2(1), 6.
- [10] Darrat, A. F., & Al-Yousif, Y. K. (1999). On the long-run relationship between population and economic growth: Some time series evidence for developing countries. *Eastern Economic Journal*, 25(3), 301-313.
- [11] Department of Economic and Social Affairs, Population Division, United Nations. (2019). World population prospects 2019: highlights (ST/ESA/SER. A/423).
- [12] FAO (2019). Prevention and disposal of obsolete pesticides. Rome, Food and Agriculture Organization of the United Nations
[\(http://www.fao.org/agriculture/crops/obsoletepesticides/prevention-and-disposal-of-obsolete-pesticides/en/\)](http://www.fao.org/agriculture/crops/obsoletepesticides/prevention-and-disposal-of-obsolete-pesticides/en/).
- [13] Furuoka, F. (2009). Population growth and economic development: New empirical evidence from Thailand. *Economics Bulletin*, 29(1), 1-14
- [14] Jiranyakul, K. (2013). The Relation between Government Expenditures and Economic Growth in Thailand. *Available at SSRN 2260035 Journal of Economic Literature*, 50(15), 23, <http://ssrn.com/abstract=2260035>
- [15] Kinder, C. (1998). The population explosion: causes and consequences. *Yale-New Haven institute, The population explosionvolume 7*, curriculum unit 98.07.02
- [16] Kirk, D. (1996). Demographic transition theory. *Population studies*, 50(3), 361-387.
- [17] Klasen, S., & Lawson, D. (2007). *The impact of population growth on economic growth and poverty reduction in Uganda*, Diskussionsbeiträge, No. 133, <http://hdl.handle.net/10419/31966>
- [18] Kothare, R. (1999). Does India's Population Growth Has A Positive Effect on Economic Growth?. *Social Science (410)*.
- [19] Kuznets, S. (1967). Population and economic growth. *Proceedings of the American Philosophical Society*, 111(3), 170-193.
- [20] Li, Y. (2016). The Relationship between Fertility Rate and Economic Growth in Developing Countries,21823, www.ehl.lu.se
- [21] Malthus, T. R. (1798). *An Essay on the Principle of Population*, printed for J. Johnson, London.
- [22] Mawugnon, A. K., &Qiang, F. (2011). The relationship between foreign direct investment and economic growth in togo (1991–2009). In *Proceedings of the 8th International Conference on Innovation and Management (ICIM 2011), Kitakyushu, Japan, November 30–December 2, 2011, E1269 E* (Vol. 73).
- [23] Mehrara, M., &Musai, M. (2013).The causality between capital formation and economic growth in MENA region. *International Letters of Social and Humanistic Sciences*, 8, 1-7.
- [24] NBS (2018) National population projections Government of Tanzania Dar es Salaam, National Bureau of Standards.
- [25] Peterson, E. W. F. (2017). The role of population in economic growth. *Journals.sagepub.com/hom/sgo,SAGE Open*, 7(4), 1-15, DOI:10.1177/2158244017736094

- [26] Pesaran, M. H., & Shin, Y. (1998). An autoregressive distributed-lag modelling approach to cointegration analysis. *Econometric Society Monographs*, 31, 371-413.
- [27] Putera, I. K. W. T., Zheng, J., & Liping, L. (2011). Population growth and economic growth in Indonesia. *Tilburg University: FEB*, 1-33.
- [28] Rostow, W. W., & Rostow, W. W. (1990). *The stages of economic growth: A non-communist manifesto*. Cambridge university press.
- [29] Silajdzic, S., & Mehic, E. (2018). Trade openness and economic growth: Empirical evidence from transition economies. In *Trade and Global Market*. IntechOpen, <http://dx.doi.org/10.5772/intechopen.75812>
- [30] Swai, L. (2018). *Effective Management of Sales and Tax Collection using EFD Machines, The Case study of Ilala Region* (Doctoral dissertation).
- [31] Tanzania, N. B. S. (2002). 2002 Population and Housing Census.
- [32] Tanzania, N. B. S. (2012). Population and Housing Census. 2013.
- [33] Tartiyus, E. H., Dauda, T. M., & Peter, A. (2015). Impact of population growth on economic growth in Nigeria. *IOSR Journal of Humanities and Social Science (IOSRJHSS)*, 20(4), 115-123
- [34] Thuku, G. K., Paul, G., & Almadi, O. (2013). The impact of population change on economic growth in Kenya. *International Journal of Economics and Management Sciences*, 2(6), 43-60.
- [35] TNBC. (2009). Kilimo Kwanza-Towards Tanzanian Green Revolution.
- [36] United Nations Commission on Trade and Development (UNCTAD). (2002). World investment report 2008.
- [37] UNDP, U. (2010). United National Development Assistance Plan 2010-2015.
- [38] World Health Organization. (2020). Stronger collaboration, better health: 2020 progress report on the global action plan for healthy lives and well-being for all.