

Predicting Population Growth through Births and Deaths Rate in Nigeria

T.O Olatayo¹ and N.O Adeboye²

1. Department of Mathematical Sciences, Olabisi Onabanjo University, Ago-Iwoye, Nigeria

2. Department of Mathematics & Statistics, Federal Polytechnic, Ilaro, Nigeria. P.M.B 50

E-mail Address: adeboye_olawale@yahoo.com. Phone Numbers 0803334814, 08186530233

Abstract

The study focuses on the socio-demographic analysis of the factors which lead to high birth and deaths rates in South Western region of Nigeria and its consequences on the population/economy.

The results revealed that the Crude Birth Rate(CBR) of South West was between 0.59 and 0.78 while the Crude Death Rate (CDR) was estimated to be between 0.19 and 0.24 per '000 yearly population. Using Regression analysis, the study demonstrates that both birth and death rates for the given sample period, have exerted much significant influence upon the population of South West as observed in the Coefficient of determination(R^2) of 72.3% arrived at in the Regression analysis.

Keywords: Birth Rate, Death Rate, Regression, Population, Coefficient of Determination.

1. Introduction

In the last census exercise conducted by the National Population Commission in 2006, Nigeria's population was put at nearly one hundred and forty million. This is undoubtedly an alarming figure for a country with distressed economy. The consequences of overpopulation is well known, with characteristics of Socio-economic problems such as unemployment or underemployment, low level of per capital income, low standard of living, poverty, huge external debt burden and many more social vices becomes manifested.

According to a survey report published in The Guardian Newspaper, on Monday, December 1st, 2008 on "Why planners are central to Lagos cities development" of South western region. Falade (2008), stated that Lagos state population have grown from 300,000 in 1950 to 7.7 million people in 1990. Although the population figure for Lagos was 9.03 million as declared in the controversial 2006 population and housing census. Other statistical sources have estimated the population of Lagos state to be much higher. According to UN estimates of 1999, the population of Lagos state would have expanded to 25 million people by 2015, when it was expected to be the third most populous city in the world. It is difficult to draw the bottom line where the South west will be by then, going by this conflicting figures.

An important area where data collection is essential is human population. Its data collection procedure is usually by direct enumeration of every individual in the territory at approximately the same time. Collecting data on human population involves a complex series of related activities. There is no gainsaying the fact that accurate population statistics is vital to sound development planning and economic management. Apart from information on the stock of the country's population, it is essential to know the rate at which the population is changing, structurally and in the aggregate.

Provision of good health services and facilities has been advance as a major cause of high birth rate. Adequate and affordable health services enhance the chances of safe delivery, reduce miscarriages, still births and also reduce infant mortality.

According to Jamison (2003), improvement of life expectancy especially in developing countries like Nigeria and the sharp drop in child mortality can be attributed to the huge investment in the health sector by most government

especially in the developing countries. His opinion reflected in the case of South west, considering the huge resources already pumped into the health sector by the government. It is pertinent to reflect in this study that, health care services for infants up till 12 years in most South west state is now free without any encumbrances. He stressed that improved health increases the enrolment of children in school and make them learn better and generate for the society able bodied and skilled man-power needed for promoting economic growth.

African sociologists have a different view concerning the reason for high birth rates. According to them, some religious groups such as Islamic religion permit a man to marry more than one wife and which is often a precondition for the accord of certain rights and privileges. In the cultural explanation, certain rights and honours are only conferred based on the number of wives and children a man has. Moreover, in the traditional agrarian societies, more children means more hands on the farm. According to Oтите and Oгionwo (1985), polygamy (marriage of one man to more than one woman) is a common indigenous system of marriage in most if not all African countries. According to them, some traditional rulers for example in Cameroon were said to have had as many as 300 wives. They maintained that polygamy is practiced in almost all the religions in Nigeria.

Further causes of high birth rates are high birth fertility and low mortality. According to Fapohunda (1979), the size of any population is correlated with the level of fertility and infant mortality. It is positively correlated in the first case and negatively correlated with the later. She argues that the Nigerian population is growing at a high rate of 2.5% per year due to a high fertility rate and a decreasing mortality rate, particularly among infants. Fapohunda further argued that since the population is growing rapidly due to a high fertility rate and a declining mortality rate, an increasing proportion of the population is under 15years of age and is for the most economically inactive. They are basically dependent on the economically active group.

She thus maintained that as long as Nigerians fertility remains high, the prospect is that the proportion of the population who are children will remain high and finally she maintained that the human resources of a country are similar to the capital resources in that not only can the stock increase through rapid birth rates, but investments can also improve its production capacities. Also urban unemployment exists in Nigeria because the growth of new job seekers is increasing at a faster pace than the growth of employment opportunities. The genesis of this social problem is traced from high birth, low infant mortality and consequently high turnout of graduates of diversified disciplines who could not be accommodated in the employment market. Becker (1975), added to this, by conceptualizing economic growth in terms of human capital as a strategic input. Thingani (1995), conceived economic growth as a generalized process of capital accumulation in which human capital has a complimentary limits with other forms of capital. From this definition, it becomes clear that the role of human effort in economic development cannot be overlooked. It therefore implies that an increase in population matched with necessary educational and training facilities is capable of providing a nation with skilled labour force whose contributions to economic advancement cannot be over-emphasised.

Death on the other hand, is caused basically by several diseases which are environmental oriented. Poor environmental sanitations as evident in poor sewage disposal system, inadequate supply of clean drinkable water are major causes of some known diseases like Typhoid, Malaria, Cholera and several others.

Malaria is one of the commonest diseases that claims many live in tropical countries like Nigeria. According to Hanson (2004), malaria strikes an estimated 100 million or more people in the developing countries each year, killing one to two million of them. It is one of the biggest killers of children in sub-Sahara Africa. The economic cost of malaria is also stressed by Anne Mills. According to Ann (2008), the impact of the disease on the economy and economic development efforts as seen in reduced productivity caused by workers illness and its financial burden on individuals and government cannot be over emphasized.

Due to its widespread nature, precise estimates of the mortality and morbidity of malaria are often hard to come by. Unsurprisingly, there are no accurate statistical estimates of deaths caused by malaria in Nigeria.

Jamison (2003), in his study in the 2003 world development report, attributed several causes of death to environmental habit and social factors. According to him, many cities suffer from air pollution caused by industries, power plants, road transport and domestic use of coal. He stressed that atmospheric pollution is a major cause of respiratory disease in urban centres. Jamison further stressed that inadequate environmental sanitation and impure water supply are major causes of tuberculosis and typhoid diseases. He claims that about 1.3 billion people in

$$Y = X\beta + u \quad (1.6)$$

To obtain the consistent estimators of β , we minimise the residual sum of square (SSE) which is normally given as $ESS = u'u$ (1.7)

$$\text{But } u = Y - X\beta \quad (1.8)$$

$$\begin{aligned} \text{Hence, } u'u &= (Y - X\beta)'(Y - X\beta) \\ &= Y'Y - \beta'X'Y - Y'X\beta + \beta'X'X\beta \\ &= Y'Y - 2\beta'X'Y + \beta'X'X\beta \end{aligned}$$

Since the transpose of a scalar is a scalar, thus;

$$Y'X\beta = (Y'X\beta)' = \beta'X'Y$$

$$\text{Thus, } \frac{\partial u'u}{\partial \beta} = -2X'Y - 2X'X\hat{\beta} = 0$$

$$2X'X\hat{\beta} = 2X'Y$$

$$\hat{\beta} = (X'X)^{-1} X'Y \quad (1.9)$$

Where Equation (1.9) is the least square estimates for the parameters of a classical linear regression model.

The test statistic used for the goodness of fit are the coefficient of determination (R^2), the student-t, F- distribution and the standard error test.

3. Results and Discussion.

3.1 Analysis of Population and Birth Rates

The estimated regression model is:

$$\text{Population} = 10,666,394.87 + 389.89\text{Births} \quad \text{i.e}$$

$$Y = 10,666,394.87 + 389.89X_1$$

The value of 'r' for model produced by this regression is 0.596, which shows a positive correlation between the population of Lagos state and recorded births. $R^2 = 0.356$, which shows that only 35.6% of the variation in the population (Y) of Lagos state is explained by the birth recorded. $F = 1.656$ with a significant value of 0.288. It means that the recorded birth of Lagos state do not explain very well the variation in population of Lagos state. Though the t values of $\beta_0 = 3.553$ and that of $\beta_1 = 1.287$ fall in the positive critical region but that of β_1 is less than +2. This implies therefore that only β_0 estimate is significant. For the Standard error test, only the estimates of β_0 is also statistically significant since its standard error is less than half of its estimate i.e $3,001,803 < 5,338,642.93$.

In summary, birth rates for the given sample period has not exerted much significant influence upon the population of Lagos state as reflected in the coefficient of determination of 35.6% and the test of significance carried out for the regression coefficients.

3.2 Analysis of Population and Death Rates

The estimated model is $\text{Population} = 9,509,306.013 + 1,632.248\text{Deaths}$ i.e

$$Y = 9,509,306.013 + 1,632.248X_2$$

In this analysis, $R^2 = 0.663$, which shows that only 66.3% of the variation in the Population (Y) of Lagos State is explained by the deaths recorded. $F = 5.892$ with a significant value of 0.094, it means that the recorded deaths of Lagos state do not explain very well the variation in the Population of Lagos state. Both the t values of $\beta_0 = 4.587$ and

that of $\beta_2 = 2.427$ fall in the positive critical region therefore implying that the two estimates are statistically significant since the standard error are less than half of their estimates i.e $2,073,034.081 < 4,754,653.007$ for β_0 and $672.435 < 816.124$ for β_2

In summary, death rates for the given sample period exerted much significant influence upon the population of Lagos state than the recorded births as reflected in the coefficient of determination of 66.3% and the test carried out for the regression coefficients.

3.3 Analysis of Population, Birth and Death Rates Combined

The estimated model is Population = 8,518,030+181.380Births+ 1,373.199 Deaths

i.e $Y = 8,518,030 + 181.380X_1 + 1,373.199X_2$

$R^2=0.723$, which shows that 72.3% of the variation in the Population(Y) of Lagos State is explained by the combined effect of births and deaths recorded in Lagos state hospital.

$F = 2.609$ with a significant value of 0.277, it means that the recorded births and deaths of Lagos state do not explain very well the variation in the Population of Lagos state.

The t statistics is also used as a guide, since t for $\beta_0=3.099$ is well above +2, this show that β_1 and β_2 are statistically insignificant .

In summary, the combined effect of birth and death rates for the given sample period exerted much significant influence upon the population of Lagos state than both the recorded births and deaths when considered individually as reflected in the coefficient of determination of 72.3% . This shows that 72.3% of the variation in (Y) is accounted for by the variation in (X1) and (X2). The remaining 27.7% of the variation in population figure of Lagos State that is not accounted for by the births and deaths recorded in Lagos state hospital may be due to other factors such as immigrants and emigrants.

4. Conclusion

Going by the existing literature, including the ones reviewed in this study, there seems to be an in exhaustive work on birth and death rates with special reference to Nigeria population and the economy. There is general believe that economic stagnation is often linked with over population and poor investment in health services. In recent times, policy makers in most part of the globe has taken these twin problem very seriously and in fact have considered them as major obstacles in their wheels of progress.

With Nigeria's population currently put at over 140 million people compared with Gross Domestic Product (GDP) that is not too encouraging and inflation still sky-rocketing, there is the fear that future living standards may substantially depreciate. From the multiple regression analysis carried out, it can be reasonably concluded that the remaining 27.7% of the variation in population figure of Lagos state that is not accounted for by the births and deaths recorded in Lagos state hospital may be due to other factors such as immigrants and emigrants.

5. References

Ann, F. (2008). Population, Resources and Environment (http://www.Voxfux.com/features/malthusian_theory.htm).

The Edwin Mellon Press. (http://www.Voxfux.com/features/malthusian_theory.htm)

Elwell, F. (2001). A Commentary on Malthus's 1798 Essay on Population as Social Theory.

Becker, G. (1975). Human Capital, A Theoretical and Empirical Analysis with Special Reference to Education. 2nd Edition, New York; Columbia University Press. Page 10.

Briscoe, J & D. Whittington (2003). The Demand for Water in Rural Areas: Determinants And Policy Implications.

A Publication of the World Bank, June 1992.

Falade, J. (2008): A Survey Titled, Why Planners Are Central To Lagos Cities Development. The Guardian, Monday, December 1, 2008.

Fapohunda, E. (1979). Population, Labour Utilization and Manpower Development. 1st Edition, London, Macmillan Press Limited. Page 113-114

Hanson, k & A. Mills (2004). The Economics of Malaria Control. A Publication of The Global Forum for Health Research (<http://www.globalforumhealth.org/filesupld>)

Jamison, D (2003). "Investing in World Health" in World Development Report-2003, Oxford University Press.

Otite, O. and W. Ogionwo (1985). An Introduction to Sociological Studies. 1st Edition, Nigeria, Hienemann Educational Books (Nig) Ltd. Page 81.

Thingan, M.L (1995). The Economics of Development and Planning. India, NIKAS Publishing House, PVT LTD.

Kasumu, R.B (2000). A Basic course in Statistics. 1st Edition, Lagos, Fatol Ventures. ISBN 978-32568-31. Various Pages.

This academic article was published by The International Institute for Science, Technology and Education (IISTE). The IISTE is a pioneer in the Open Access Publishing service based in the U.S. and Europe. The aim of the institute is Accelerating Global Knowledge Sharing.

More information about the publisher can be found in the IISTE's homepage:

<http://www.iiste.org>

CALL FOR PAPERS

The IISTE is currently hosting more than 30 peer-reviewed academic journals and collaborating with academic institutions around the world. There's no deadline for submission. **Prospective authors of IISTE journals can find the submission instruction on the following page:** <http://www.iiste.org/Journals/>

The IISTE editorial team promises to review and publish all the qualified submissions in a **fast** manner. All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Printed version of the journals is also available upon request of readers and authors.

IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digital Library, NewJour, Google Scholar

