BILINGUAL PUBLISHING CO.
Pioneer of Global Academics Since 1984

Journal of Economic Science Research
http://ojs.bilpublishing.com/index.php/jesr

ARTICLE

The Determinants of Population Growth in Rwanda

Daniel Ruturwa Sebikabu* **Ignace H. Kabano**

Department of Applied Statistics, School of Economics, University of Rwanda, Rwanda

ARTICLE INFO

Article history
Received: 27 May 2019
Accepted: 19 July 2019
Published Online: 26 July 2019

Keywords:
Population
Fertility
Birth
Death
Life Expectancy
Rwanda

ABSTRACT

The fertility occupies a central position in the study of population growth. The growth of the population depends entirely on human fertility, including birth, death rates and life expectancy. Growth of the fertility is one of the key determinants of the Population Growth. This paper focused on the determinant factors of population growth in Rwanda. From the findings, there is a statistically significance of fertility trends at 0.05 percent because the t-statistic in table-4 is greater than its critical value (1.96) at 0.05 percent. The results provides evidence of Fertility, birth, death and life expectancy as factors which boost population to grow in Rwanda. The results founded, indicate the existence of high fertility rates even decreasing, lead to increase population due to its positive values over time. This means that Fertility rates in Rwanda has a positive impact on the country's population growth, especially in the youth who realizes around 48 percent of entire Rwandan's Population. The relationship between fertility rate and the time describe a decreasing function, which interesting for us showing that fertility has been reduced over time. In other words, as well as the years increased, the fertility decreased. The coefficient of Time is (-0.117035) which implies that a unit change in time will change Total Fertility Rate (TFR) by (-0.117035), table-1. The model of fertility represents a decreasing function while the time function still increasing, as shows in the figure-2. The fertility variable has positive relationships with the population dependent variable even the fertility coefficient is negative, the probability p-value is significant at 0.05 significance level on one hand and the absolute t-statistic is great than the critical value at 0.05 level of significance, which confirm the statistically significance of t-statistic. The coefficients on the death rate and Life expectancy are respectively positive and significant at all confidence level, table-5.

1. Introduction

Analysis is a process of verification and data examination, by transgression it within its parts of component to discover the existence relationships between them [1].

The examination and evaluation of the information to select the best course of action of data and facts to uncover and understand cause-effect relationships that was providing basis for problem solving and decision-making. Indicators based on Population Growth like Fertility, Mortality and Migration have taken an important role in the way of determining of this growing of population [2]. Some analysis and method to construct models describing of data set of observed variables in terms of a smaller set

**Corresponding Author:*
Daniel Ruturwa Sebikabu,
Department of Applied Statistics, School of Economics, University of Rwanda, Rwanda;
E-mail: danielruturwa@gmail.com

 DOI: https://doi.org/10.30564/jesr.v2i3.868

of unobserved variables, called factors have been done [3]. Meta-analysis combines the outcomes of numerous studies that address a set of related research hypotheses has been respected in way to analyze and make a good interpretation [4].

2. Problem Statement

The mathematical expressions used to describe population growth are necessarily empirical. The exact law of population growth has been formulated. These methods are satisfactory as well as for short-term predictions and for much suitable for long-term projection particularly because of assumption that the social and economic forces that have controlled the population growth in the past, have been also contributed in the future. There was significant certainty in the calculation of future population, known as projection. Our knowledge regarding forces affecting underlying changes in mortality, fertility and migration was rather incomplete. The reason behind such problems was the assumption that certain policies and programs has been successfully at the future point of time, that was the why any word like estimation, forecast etc., should be used in this connection.

The projection of Population was based on current information about speed of growth, direction of flow and it was required to be amended time to time. The World Population Prospects Revision (2015) was the twenty fourth stout of official United Nations population estimates and projections that have been organized by the office of Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, builds on the earlier revision by incorporating additional outcomes from the 2010 overweight of national population censuses as well as findings from the recent specialized demographic and health surveys that have been approved about the world.

3. Literature Review

A systematic review of the major studies in this literature represents a useful way to organize a survey of the consequences of demographic change. Such an approach places the population debates in perspective, and it infuses a healthy dose of caution in appraising current debates. Specifically, how have the "bottom-line" appraisals of the consequences of demographic change on development changed over time; why have they changed; and what are the most recent contributions to this literature [5]. We live in a world of unprecedented demographic and economic change. Population growth and the associated demographic issues swallow almost all the gains from such progress in most of the third world countries. The growing population and the demographic structure has been the root cause for many of the social economic problems confronting the growing economies [6]. However, such demographic diversity of populations also provides opportunities for development, as population growth is the basis for labor growth and a source for constant search for innovations and improvements [7] . Labor force growth and innovation are vital for the current pace of development. In spite of this positive element, the other dimensions of population growth cause worry [8]. Almost all of the recent growth in population is taking place in developing countries and continues to concentrate among the poorest communities in urban areas [9]. Whenever the population growth occurs it imposes certain effects in the environment where the population live which has implications on the country's economy [10]. Obviously, the grown population is assumed to increase the labor force that work actively and, in return, this improves the national economy in the concerned country despite few economists who are opposed to this point of view by evoking that the population growth causes declines in the country's economy. Even though that is the reality behind the scenes, we agree with the positive correlation between the population growth and economic growth, which leads to the economic development because it remarkably keeps going up in a certain period of time [11].

4. Demographic Perspectives

Demography is the study of the growth, change, and structure of the human population. Changes in a population's size and structure are caused by changes in the birth rate, the death rate, and the net migration rates. Demographic research focuses on why people have the number of children they do; on factors that affect death rates; and on the reasons for immigration, emigration, and geographic mobility. Understanding a society's demography is an essential tool in determining current and future public health needs [12], is generally thought to be a father of substantive demography, and is certainly better known. He achieved this position not because of what he said was all new, not because of what he said was all true, but because he initiated tremendous controversy and debate over the relationship between Food and Population. As a matter of fact, Malthus's assay on the principle on the population was that human populations tended to increase at a more rapid rate than the food supply needed to sustain them.

5. Effects of Population Growth

The fertility occupies a central position in the study of

DOI: https://doi.org/10.30564/jesr.v2i3.868

population for several reasons. Human fertility is responsible for biological replacement and for the maintenance of the human society [13] . The growth of the population of the world depends entirely on human fertility. Any society replenishes itself through the process of human fertility. Thus, in population dynamics, fertility is a positive force, through which the population expands, counteracting the force of attrition caused by mortality. If this replacement of human numbers is not adequate that is, if the number of deaths in a particular society continues to be more than that of births, that society would face the danger of becoming extinct. Within the biological limits of human fertility, several social, cultural, psychological, as well as economic and political factors are found to operate, and these are responsible for determining the levels and differentials of fertility [14].

The experiences of other countries also demonstrate that fluctuations in the fertility rates of a country might take place in response to political social and economic conditions. In the 1960s, it was increasingly realized that the "problematic factor" in the population growth of developing as well as developed countries was the birth rate.

Population growth and development is a subject of vast importance and undeniable urgency [15]. The past hundred years have brought to this globe extraordinary economic and technological progress, and vast increases in population. It is time now to use our economic gains and our accumulated wisdom to better the human condition. Although the effects of fast population growth may vary widely, depending on the institutional, economic, cultural, and demographic setting, all the evidence points overwhelmingly to the conclusion that it slows development in the developing countries. And the poor of these countries are the principal victims of the slowdown. The problem to be examined seems to be insufficiently understood in many areas of the globe. Even under the most optimistic assumptions, the developing world's populations today will more than double by the middle of the next century.

6. Objectives

To determine the major factors contribute to the population growth,

To find out the involvement of the mentioned variables in population growth,

To access le relationship between those variables and population growth.

7. Data

Data used in this study was the secondary data. The basic data for fertility come from the following three sources: (1) Vital Registration System or Civil Registration System, which is the number of births usually registered in one calendar year; (2) The National Periodic Censuses, the number of children ever born and children surviving by the age of mother, age distribution and the number of births during the last one year; and, (3) Sample of fertility survey, the number of children ever born, and deaths during the last 12 months.

8. Methods

Population Growth is the increase in the number of people that reside in a country, state or city. At this stage, the study done was based on the analysis of different factors that contribute to the population Growth. To determine whether there has been population growth, birth rate, death rate and life expectancy have been examined. The change of population refers to the change of some indicators like fertility, mortality and migration, principal indicators which determine whether population has been changed or grown. With Some mathematical techniques applied, the above indicators have been analyzed in the ways to understand the fact of population growth.

Analysis of population growth has followed the structure such as World Population trends and their growth rate, Rwanda Population trends with its size and growth rates. The study was based also on the trend of population of the world and major areas according to the Medium-variant Projection. This procedure of practice has also done in Rwanda population with purpose of comparing areas which have high fertility, mortality and other characteristics regarding the change of population.

9. Specification Models

Three linear function techniques were presented to show the determinants of population growth. First linear function was a function of fertility with respect variable of over time. At this stage, during the period of study, in Rwanda, fertility has been examined for purpose of determination of its influence on population growth. The mathematical function was established in the following form below:

$$TFR = F\ (time) \quad (1)$$

Econometrically, this can be stated thus;

$$TFR = \beta 0 + \beta 1\ TM + U \quad (2)$$

Where TFR:Total Fertility Rate, TM: Time, expressed in terms of years, U: stochastic or error term, β0 is intercept term explaining total fertility rate when the explanatory variable is equal to zero, and β1 is coefficient at-

 DOI: https://doi.org/10.30564/jesr.v2i3.868

tached to the explanatory variable explaining his effect on the dependent variable. The second linear function was a function of population growth with respect variable of fertility. We have demonstrated how the population growth change was presented as long as fertility change. The relationship between population growth and fertility has also been examined. The relationship's mathematical function established between population growth and fertility was:

$$POP = F\ (TFR) \quad (3)$$

Econometrically, this can be stated thus;

$$POP = \beta 0 + \beta 1\ TFR + U \quad (4)$$

Where POP: Population Growth, TFR: Total Fertility Rate, U: stochastic or error term, β0 is intercept term explaining population growth when the explanatory variable is equal to zero, and β1 is coefficient attached to the explanatory variable explaining his effect on the dependent variable. The third function was a function which presented more than two explanatories. At this stage, the relationship between population growths with respect to several variables was considered as multivariate regression model of crude births rate, crude deaths rate and life expectancy.

$$POP = f\ (CBR, CDR, LEXP) \quad (5)$$

Econometrically, this can be stated thus;

$$POP = \beta 0 + \beta 1\ CBR + \beta 2\ CDR + \beta 3\ LEXP + U \quad (6)$$

Where POP: Population Growth, CBR: Crude Births Rate, CDR: Crude Deaths Rate, LEXP: Life expectancy, U: stochastic or error term. B_0 is intercept term explaining population growth when the explanatory variables are equal to zero, and βi, i=1, 2, 3… are coefficients attached to the explanatory variables explaining their effects on the dependent variable.

10. Results and Discussion

Table 1. Rwanda population's trends and growth rates (1978-2027)

Year	Pop. (million)	Rate (%)	Year	Pop. (million)	Rate (%)
1978	4.8	3.31	2005	9.4	1.87
1980	5.1	3.41	2010	10.8	2.87
1985	6.1	3.98	2013	11.8	2.74
1990	7.2	-0.13	2015	11.3	1.11
1995	5.7	-1.13	2020	12.7	1.25
2000	8.4	6.68	2027	14.8	1.47

Source: World Bank, 2012

Rwandan population trends, presented in the above table, explain how the total national population grew over years, since 1978, and they project the expected growth rate until 2027. These observations are to be discussed in three dimensions: between 1978 and 1990, the population size grew remarkably with high growth rates, an average of 3.58 percent, emphasizing that there was high population growth in those days. However, since 1990 until 1995, the population growth declined sharply due to the national war and Rwandan Tutsi genocide that massively killed many people, around one million soles, while the remaining big portion exiled; that is why the population growth rate fell in negative up to (-1.13) per cent. The third phase of observations starts from 2000 where the population growth culminated to 6.68 percent, regarded as the pick point ever since. This occurred because many Rwandan people came back in from all over the world, where they had had a long stay due to many reasons, including political ones. This was a beginning of a new era when Rwandan government started rebuilding almost everything, including social-economic practices to stabilize the population size to a reasonable level. For the same reason, the population growth rate slowed down to 2.74 in 2013. With determination to fix this situation and to enhance social- economic stability, results from the fourth survey (EICV4) showed that the population growth declined and was maintained somewhere between 1 and 1.5 percent up to 2027 as showed by Rwandan Population Projections reports.

10. 1 Fertility

Fertility is the ability to reproduce or to have babies. When fertility rates in a community increase, more babies are born. Fertility is also the quality of a human's ability to produce offspring, which is dependent on age, health, and other factors.

Population Projections are usually carried out immediately after the release of census results so as to provide annual estimates of future population counts broken down by age and sex. Nonetheless, Projections are to be updated whenever new evidences concerning factors of population growth emerge, especially when such evidences are different from the assumptions on which the projection was based. In this context, the 2007/2008 Rwanda Interim Demographic and Health Survey (RIDHS) has shown different fertility and mortality levels than those incorporated in the latest (2004) set of Population Projections which was carried out after the release of the 2002 Census results. This is in fact what has prompted updating the population projections of Rwanda.

The national projections require measuring fertility,

DOI: https://doi.org/10.30564/jesr.v2i3.868

mortality and international migration in the base projection year, as well as projecting the future trend of those factors of population growth. Although three projection variants can be used to run a wide study of different fertility trends, our study is based on the median variant. Similarly, the mortality projection was conducted in same manner. The 2002 census population has been retained as the projection base year population, yet it was evaluated for coverage and age reporting errors, where necessary adjustments were introduced. The Projection Period was determined to be 2002-2022. The following descriptions of population growth result on the examination of the population projections due to fertility, mortality and migration.

In Rwanda, the Demographic Health Survey (DHS) is the only reliable source for fertility estimates. Four bands of DHS have been conducted in the country in the years 1992, 2000, 2005, and an Interim Survey in 2007. In all surveys fertility, mortality and migration are measured for the three-year period preceding the field visits. Fertility is the most important factor of population growth influencing population projection.

Table 2. Total Fertility Rate Trends (RDHS 2005 - RDHS 2014-15)

Surveys	RDHS 2005	RDHS 2007-08	RDHS 2010	RDHS 2014-15
TFR	6.1	5.5	4.6	4.2

Source: RDHS, 2014-1

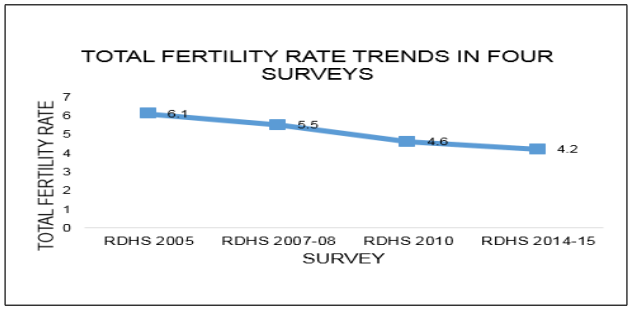

Figure 1. Total Fertility Rate Trends in four surveys

For the purpose of estimating future fertility, past fertility levels and patterns have been analyzed with the aim of fitting a model that can be used to estimate fertility in future time points. In other words, a linear or curvilinear model, which ever better fits the data and simulates the nature of the relationship between fertility measure as dependent variable and time as independent variable is to be sought. According to the results of a study over Trends in Fertility from 1978 to 2012 in Rwanda, there is, generally, a high age specific fertility rates (ASFR) between 20 and 24 up to 35 and 39 age ranges. More precisely, the fecundity in Rwanda is very high within women aged between 25 and 29 years old. The findings of the study of trends in fertility from 1978 to 2012 showed that the Total Fertility Rates (TFR) trend declined from 8.6 percent (1978) to 4.0 percent (2012); this means there was a considerable fertility rate decline estimated around 53 percent. This was caused by national development throughout education, health, social-economic training programs in conjunction with leaders and government commitment, family planning and health insurance among others. Apart from Total Fertility Rate (TFR) that declined remarkably, there is an overview of both General Fertility Rate (GFR) and Crude Birth Rate (CBR) that declined from 237 to 122 and 54.1 to 30.9, respectively.

Table 3: Linear function trends of fertility and it's graphical over time

Dependent Variable: TFR

Variable	Coefficient	Std. Error	t-Statistic	Probability
TIME	-0.117035	0.007095	-16.4944***	0.0000
C	9.148573	0.217428	42.0764***	0.0000
R-squared	0.959749	Adjusted R- sq.	0.95869	
F-statistic	906.0748	Prob(F-statistic)	0.0000	

Source: Author's computed through EViews Software

(***) indicate statistical significance at 0.05 level of significance.

From the findings, there is a statistically significance of fertility trends at 0.05 percent because the t-statistic in table above is greater than its critical value at 0.05 percent. A relationship between fertility rate and the time describe a decreasing function, which rally interesting for us showing that fertility has been reduced over time. In other words, as well as the years increased, the fertility decreased. The coefficient of Time is (-0.117035) which implies that a unit change in time will change Total Fertility Rate (TFR) by (-0.117035). The estimation model of fertility here represents a decreasing function while the time function still increasing, as shows in the figure-2. Linear function trends of fertility represented over time: TFR = + 9.15 - 0.12*TIM

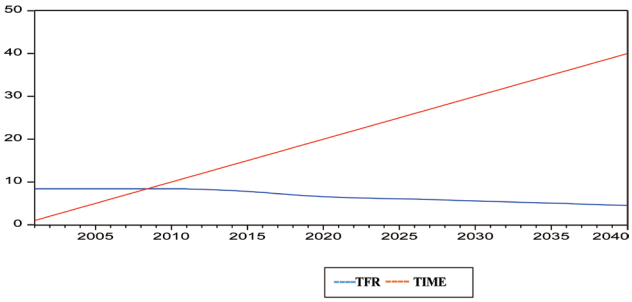

Figure 2. Linear function trend of Fertility

DOI: https://doi.org/10.30564/jesr.v2i3.868

Table 4. The Fertility Impact on Population growth as linear regression

Dependent Variable: POP

Variable	Coefficient	Std. Error	t-statist Prob.	Proba.
TFR	-1410.891	160.1139	-8.811793***	0.0000
C	16862.10	1166.754	14.45215***	0.0000
R-squared	0.807257	F-statistic	159.1537	
Adjusted R-squared	0.802185	Prob(F-statistic)	0.000000	

(***) indicate statistical significance at 0.05 level of significance.

The fertility variable has positive relationships with the population dependent variable even the fertility coefficient is negative, the probability p-value is significant at 0.05 significance level on one hand and the absolute t-statistic is great than the critical value at 0.05 level of significance, which confirm the statistically significance of t-statistic, since they are theoretically positively related each other's. From the partial slope parameter, it can be inferred that if Fertility should change by a percentage point, Population will change by 1410.891units. Similarly, if Fertility should increase by 1 percentage point, Population (POP) Growth will be estimated by the prediction of the whole function, which is 15451.209 units. Population Function with respect variable of fertility is represented as follows:

$$POP = 16862.1\text{-}1410.9*TFR$$

Table 5. Other Factors which contribute to the Population Growth

Dependent Variable: POP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CBR	-249.7759	26.44493	-9.445134***	0.0000
CDR	136.2208	51.09003	2.666290***	0.0114
LEXP	192.3842	43.16740	4.456700***	0.0001
C	7062.616	3535.671	1.997532	0.0534

Source: Author computation

The coefficient on Crude death rate has positive sign that is statistically significant at the 99% confidence level. Specifically, according to the Augmented Dickey Fully test (ADF) estimation, a one percent increase in the death rate leads to about 136.2% of percentage increase in population. The coefficient on the Life expectancy is positive and significant at all conventional confidence level. According to our estimates from VAR and Augmented Dickey Fuller (ADF) test, a one percent increase in life expectancy will cause a change of population of a result about 192.4 percentage points rise in the Population. Instead of the coefficient of Birth rate is negative, it is statistically significant at all confidence levels. Our results from the VAR and ADF test estimation for instance, indicate that a one proportion fact increase in the degree of honesty causes population to decline by (-249.8) percentage points.

In general, the study done on this point show that a part fertility, there are others factors which contribute efficiently and effectiveness to the population growth, such that Birth rate and death rate on one hand and life expectancy on other hand. According to the table-6, the estimated equation shows that population depends on the birth rate, death rate and life expectancy which are independent variables and determinants of population as presented in the equation below

$$POP = 7062.6 - 249.8*CBR + 136.2*CDR + 192.4*LEXP$$

10. 2 Population Trend Explained by Figures from CBE, CDR and LEXP

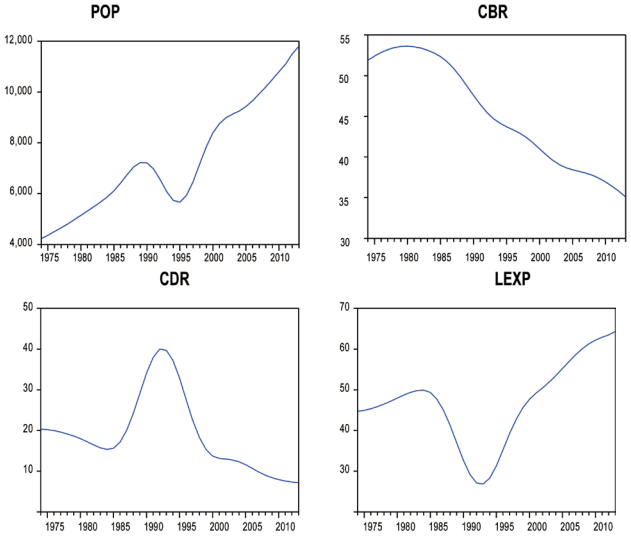

Figure 3. Population, CBR, CDR and LEXP

As we say that birth rate, death rate and life expectancy contribute efficiently and effectiveness to the population growth, it was observed that population growth dependent of the comportment of birth rate, death rate and life expectancy. Hence, during the period of 1975-1985, the crude death rate has been decreased while the crude birth rate and the life expectancy increased. These comportment shows clearly that the population situation followed an increasing evolution. From a period of 1985-1993, the crude death rate increased highly while crude birth rate and life expectancy decreased lowly. Therefore, population growth decreased sensitively and form the period of 1995-2013, the researcher observes through the figures (5.12), that death rate decrease sensitively while birth rate and life

DOI: https://doi.org/10.30564/jesr.v2i3.868

expectancy increase also sensitively. Consequence, the population growth grew effectiveness which shows that the different determinant variables like death rate, birth rate and life expectancy explained clearly growth of population and for that the population growth dependent exclusively of those determinant variables mentioned above which contribute to the boosting of population growth.

Table 6. Rwanda Projection of Annual Birth, Deaths and Growth rates

Year	Births	Deaths	Gr %	Year	Births	Deaths	Gr %
2007	404,792	141,015	2.64	2015	485,953	149,331	3.37
2008	417,171	142,339	2.75	2016	492,831	150,286	3.43
2009	429,065	143,538	2.86	2017	499,001	151,130	3.48
2010	440,365	144,573	2.96	2018	524,258	153,121	3.71
2011	450,980	145,421	3.06	2019	529,576	154,537	3.75
2012	460,859	146,096	3.15	2020	534,702	155,509	3.79
2013	469,970	147,171	3.23	2021	539,699	156,327	3.83
2014	478,333	148,261	3.3	2022	525,181	155,955	3.69

(NSIR, 2012)

Every year, in normal circumstances, there are usually births and deaths observed over the existing population. These two indicators, i.e. birth and death, are the two major factors behind the dynamic population change and that is how the population growth rate is determined. In general, birth counts are greater than deaths meaning positive population growth rates. Considering the above table data, ranging from 2007 observations to 2022 projections, we notice a positive population growth rate, which explains that grew and will keep growing over coming years as shows in the figure below.

11. Conclusion

The research work assesses the link between population growth and fertility rate in Rwanda using population as dependent variable while crude birth rates, crude death rates, and life expectancy were explanatory variables. Data used were collected from the World Development Indicators (WDI) and the multiple regression method of econometrics was used in estimation. In general, the study done on this point show that a part fertility, there are others factors which contribute efficiently and effectiveness to the population growth, such that Birth rate and death rate on one hand and life expectancy. According to the table-5, the estimated equation shows that population depends on the variables such that birth rate, death rate and life expectancy which are determinants of population presented in the equation.

Acknowledgements

I recognize all person who have assist me in this research, specifically Dr. Matin Ruzina who has assist me in the correction of this paper. May God bless him in his multiple research and work?

Supplement

APPENDIX: POPULATION GROWTH DETERMINANT'S ANALYSIS

YERS	**POP** (‘000)	**CBR** (‘000)	**TFR** (%)	**CDR** (‘000)	**LEXP** (Years)
1974	4230	51.92	8.34	20.28	44.70
1975	4360	52.42	8.37	20.17	44.93
1976	4500	52.85	8.40	19.93	45.30
1977	4650	53.19	8.42	19.57	45.82
1978	4800	53.45	8.44	19.11	46.45
1979	4970	53.59	8.45	18.58	47.16
1980	5140	53.62	8.45	17.95	47.91
1981	5310	53.55	8.44	17.21	48.67
1982	5490	53.39	8.42	16.43	49.34
1983	5670	53.14	8.40	15.73	49.80
1984	5870	52.81	8.36	15.30	49.91
1985	6110	52.34	8.28	15.58	49.33
1986	6410	51.70	8.17	17.10	47.70
1987	6740	50.87	8.00	20.00	44.95
1988	7050	49.87	7.79	24.12	41.25
1989	7220	48.74	7.54	29.08	36.92
1990	7210	47.56	7.27	34.04	32.61
1991	6970	46.45	7.01	37.93	29.13
1992	6550	45.49	6.77	39.97	27.06
1993	6070	44.72	6.57	39.72	26.76
1994	5730	44.14	6.42	37.20	28.26
1995	5660	43.71	6.31	32.89	31.24
1996	5930	43.34	6.23	27.62	35.14
1997	6470	42.92	6.16	22.47	39.18
1998	7170	42.38	6.09	18.27	42.74
1999	7850	41.72	6.00	15.33	45.57
2000	8400	40.98	5.90	13.71	47.64
2001	8760	40.24	5.79	13.12	49.13
2002	8990	39.57	5.67	12.95	50.44
2003	9130	39.05	5.57	12.72	51.86
2004	9250	38.67	5.46	12.27	53.46
2005	9430	38.40	5.37	11.57	55.19
2006	9660	38.20	5.27	10.67	56.98
2007	9930	38.00	5.17	9.75	58.65
2008	10200	37.73	5.06	8.97	60.09
2009	10500	37.37	4.95	8.34	61.28

 DOI: https://doi.org/10.30564/jesr.v2i3.868

2010	10800	36.91	4.84	7.87	62.21
2011	11100	36.37	4.73	7.53	62.92
2012	11500	35.77	4.62	7.28	63.49
2013	11800	35.08	4.51	7.10	64.34

References

[1] Grimaldo, F., Marušić, A., & Squazzoni, F.. Fragments of peer review: A quantitative analysis of the literature (1969-2015). PLoS ONE, 2018, 13(2): 1–14.

[2] Lindtjørn, B., Alemu, T., & Bjorvatn, B.. Population growth, fertility, mortality and migration in drought prone areas in Ethiopia. Transactions of the Royal Society of Tropical Medicine and Hygiene, 2004, 87(1): 24–28.

[3] Joiner, T. E., Brown, J. S., & Sallee, F. R.. Journal of Personality Assessment The Illusion of Mental Health : In the Mind of Which The Illusion of Mental Health : In the Mind of Which Beholder ? Psychological Reports, 2005, 85(789921171): 92–97.

[4] Basu, A.. How to conduct meta-analysis: a basic tutorial. PeerJ Preprints, 2017: 1–15.

[5] Spengler, J. J.. Population and world economic development. Science, 1960, 131(3412): 1497–1502.

[6] Kimura, F.. Chapter 4 Challenge of the Imbalance of Economic-social Development in ASEAN. 2012: 121–157.

[7] Bloom, D. E., & Freeman, R. B.. Population Growth, Labor Supply, and Employment in Developing Countries. National Bureau of Economic Research Working Paper Series, 1986, 1837.

[8] Digby J. McLaren.. Population Growth: Should Be Worried? Journal of Population and Environment Research Working Paper Series, 1996, 17(3): 243-259.

[9] Sumita Chaudhuri.. Urban poor, economic opportunities and sustainable development through traditional knowledge and practices. Journal of Global Bioethics, 2015, 26 (2): 86-93.

[10] Nagdeve, D. a. (n.d.). Population growth and environmental degredation in India.

[11] Garza-rodriguez, J.. The relationship between population growth and economic growth in Mexico, 2016, 36(1).

[12] Dunn, P. M.. Thomas Malthus (1766-1834): population growth and birth control. Archives of Disease in Childhood - Fetal and Neonatal Edition, 2009, 78(1):76–77.

[13] Chandiok, K., Mondal, P. R., Mahajan, C., & Saraswathy, K. N.. Biological and Social Determinants of Fertility Behaviour among the Jat Women of Haryana State, India. Journal of Anthropology, 2016, 1–6.

[14] Semakula, M., Ndahindwa, V., Hedt-Gauthier, B., Thomson, D. R., Kamanzi, C., & Abalikumwe, F.. Determinants of fertility in Rwanda in the context of a fertility transition: a secondary analysis of the 2010 Demographic and Health Survey. Reproductive Health, 2014, 1–9.

[15] Clausen, A. W., & Paden, D. W.. Population Growth and Economic and Social Development. The Journal of Economic Education, 2006, 16(3): 165.

DOI: https://doi.org/10.30564/jesr.v2i3.868