EXAMINING THE RELATION OF GROSS NATIONAL INCOME WITH HUMAN DEVELOPMENT FACTORS:A STUDY OF BRICS ECONOMY

A

Thesis submitted

In the partial fulfillment of the requirement for the degree

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IN

ECONOMICS

(INTERNATIONAL BUSINESS)

Submitted by-

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UNDER THE SUPERVISION OF:

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PATIALA

June, 2017

CERTIFICATE

This is certify that the thesis entitled "**Examining the relation of Gross National Income with Human Development Factors: A Study of BRICS Economy**" being submitted in partial fulfillment of requirements for the award of degree of Master of Arts in Economics, submitted in the School of Humanities and Social Sciences, Thapar University, Patiala is a bonafide work carried out under the supervision of Dr. (Ms.) Ravi Kiran, Professor& Former Head, School of Humanities and Social Sciences, & Professor In Charge Alumni Relations, Thapar University, Patiala and that no part of this project has been submitted for the award of any other

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CANDIDATE'S DECLARATION

I hereby declare that the work presented in this thesis entitled, **"Examining the relation of Gross National Income with Human Development Factors: A Study of BRICS Economy"** in partial fulfillment of the requirement for the award of Degree of **Master of Arts in Economics**, submitted in **the School of Humanities and Social Sciences, Thapar University,** Patiala, is an authentic record of my own work carried out under the supervision and guidance of **Dr. (Ms.) Ravi Kiran**, Professor & Former Head, School of Humanities and Social Sciences, & Professor In Charge Alumni Relations, Thapar University, Patiala and refers other researcher's work which are duly listed in the reference section.

The matter embodied in this thesis has not formed the basis for the award of any other degree of this or any other university.

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ABSTRACT

BRICS includes Brazil, Russia, India, China, South Africa. BRICS have become one of the most fascinating and active groups of the world which works with mutual co-operation. BRICS are newly developed industrialized countries with major population, increasing GDP, high rate of growth and have major impact on regional and global affairs. These nations had a large amount of unused capacity of labor and resources. BRICS does not aim at forming a political alliance or an official trade organization. It was developed with the objective of developing a new currency system and for increasing the dominance of developing countries in the international monetary organizations.;

Seeing political and economic changes taking place on global level the BRICS economies have invested in new ventures and have initiated to have a good place on global level. After discussing the integration of BRICS with rest of the world the main objective of researchers is to analyse different components that affect the BRICS nation and to provide a comprehensive analysis to determine the weak and strong points of these nations.

The data of various components affecting growth of different countries are taken. The growth of various heads of countries economic analysis is analyzed with help of trend rate of growth. To study these factors multiple regression model was used by taking gross national income (GNI) as dependent variable and maternal mortality rate (MMR), population, life expectancy at birth and improvement in sanitation facility as independent variable.

Year to year growth arte was also calculated to examine the correct picture of all the components affecting the countries growth rate.

CHAPTER 1

INTRODUCTION

In the few decades, BRICS (Brazil, Russia, India, China, South Africa) has shaken the world economy with a remarkable growth with increase in their share of world Gross Domestic Product (hereafter GDP) of about 11% in 1990 to 25% in 2011. Major contribution can be attributed to China and India. China has been focusing on investment based growth models and India on its economic liberalization. The growing demand of energy in china was met by Russia. Thus, Russia benefited by energy needs that China has created. Brazil followed its own macro- economic woes for faster growth. There are several reasons which show that these economies continue to grow but they fail to show magic from there remarkable growth in 2000. The period shows this growth patterns because of surge in growth inherit of these economies and partly because of sluggish growth of developed economies. That period showed major crises to which BRICS to some extend was shielded.

1.1 BIRTH OF BRICS

The Term BRIC was coined by Jim O' Neill, in 2001. Brazil, Russian, Indian and Chinese markets were considered as the largest emerging markets. BRIC economies were considered to be playing an increasing role in the world economy. When South Africa join the group the term became BRICS.

1.2 BRICS SUMMIT

BRIC countries held their first summit in 2009. In 2010, South Africa asked to join and invited thus transforming into BRICS. South Africa's president, Jacob Zuma attended BRICS summit in 2011 in Sanya, China as full member.

Afghanistan, Argentina, Indonesia, and turkey have expressed strong interest for joining BRICS and many other countries like Egypt, Iran etc have also expressed interest to become the member of BRICS.

Currently there are two banks that provide finance to BRICS:-

i) New Development Bank

ii) BRICS Contingent Reserve Arrangement (CRA)

1.3 NEW DEVELOPMENT BANK

New Development Bank is known as BRICS development bank (Indiasnaps.com). It is operated by BRICS countries. The primary role of bank is to finance infrastructure project (the Washington Post) with authorized lending of about 34 billion dollars yearly (The Huggington Post). Brazil. Russia, China, and South Africa had contributed about 10 billion dollars each to bring to about 50 billion dollars.

1.4 BRICS CONTINGENT RESERVE ARRANGEMENT (CRA)-

BRICS CRA is a framework for providing protection against global liquidity pressures (Russian Finance Ministry). This includes currency issues when its member's national currency is affected by global financial pressures. It was found that emerging economies that show rapid economic liberalization went through great economic volatility that brought uncertain macro-economic environment. CRA is a competitor to International monetary fund (IMF) along with the New Development Bank. The bank was established in 2015 by BRICS countries. The inaugural meeting of BRICS CRA governing council and Standing Committee was held on 4 September 2015 in Ankara, Turkey. It came into force on 7th BRICS summit in July 2015.

Table 1.4: CURRENT LEADERS OF BRICS MEMBER STATES

S. No	BRICS Member States	Current Leaders	Head of State/ Government
1.	BRAZIL	Michel Temer, President	Head of State and Government
2.	RUSSIA	Vladimir Putin, President	Head of State
3.	INDIA	Narendra Modi, Prime Minister	Head of Government
4.	CHINA	Xi Jinping, President	Head of State
5.	South Africa	Jacob Zuma, President	Head of State and Government

1.5 Achievements after joining BRICS

India has jumped 16 ranks and is now among on 39th spot on the global competitive index. prepared by world economic forum among 138 countries. This is second year in a row that India has jumped 16 spot. In 2015-16, India has ranked at 55th place. The World Economic Forum ranking came as a major boost for Prime Minister Narendra Modi, given his repeated

push for economic reforms in India. India's competitiveness has improved internationally particularly in goods, business and innovations.

The WEF's Global competitiveness Report 2016-17 stated that due to improved monetary and fiscal policy as well as lower oil prices, the Indian economy has stabilized and possessing highest growth among G20 countries.

India is considered second most competitive country among BRICS nations. China, on 28, remains top among the BRICS grouping although another surge by India- which climbs 16 places to 39- means there is now less of a gap between it and its peers.

1.5.1 BRAZIL

Brazil's currency is Brazilian real. Brazil is eighth largest by purchasing power parity (PPP). In 2012, Forbes said that Brazil has 5th largest number of billionaires in the world which is larger than Latin America and even United Kingdom and Japan. GDP share service was 76 % . In 2017, Unemployment was 13.7%

Brazil export transport equipment, iron ore, soybeans, footwear's, coffee, oil, automobiles, and chemicals.

Brazil import machinery, electrical and transport equipment, chemical products, oil, automobile parts, electronics. Main import partners are China (17.9%), United States (15.6%), Germany (6.1%), and Argentina (6%).

1.5.2 RUSSIA

Russian federation currency is Russian Ruble. Bank of Russia controlled the Russian monetary system. GDP growth was 0.3% in 2016. It is having 30% of the world's natural resource (Russia's Natural Resource & their Economic Effects). Russia depends on its energy revenue for its growth. Russia has sophisticated arm industry like nuclear powered submarines, firearms, short range / long range ballistic missiles. GDP share (Sector wise) services are 59.7 %. In March 2017, Unemployment is 5.4%

Russia is a major exporter of petroleum and petroleum products, natural gas, metals, woods and wood products, chemicals and wide variety of civilian and military manufactures. Major exporting partners as by 2015 are Netherlands (11.9%), China (8.3%), Germany (7.4%), Italy (6.5%), Turkey (5.6%), Belarus (4.4%) and Japan (4.2%). Russia mainly imports consumer goods, machinery, vehicles, plastic, semi- finished metal products, meat, fruits and nuts,

optical and medical instruments, iron and steel. Its main importing partners are China (19.2%), Germany (11.2%), United States (6.4%), Belarus (4.8%), and Italy (4.6%).

1.5.3 INDIA

Indian currency is Indian rupee and the whole circulation of money supply is controlled by Reserve Bank. India can be listed among the newly industrialized countries and is among the major group of 20 economies (G20). India has third largest purchasing power parity (PPP) (times of India). Mumbai is the financial capital of India with annual GDP of about US 330 billion dollars it accounts for the richest state in India. India has become the fastest growing economy surpassing the People's Republic of China. International Monetary Fund (IMF) considers India as bright spot in the global market. The long term prospective of India is positive because of its youth population which has low dependency ratio, good saving and investment ratio. GDP share of service sector 45.4%. Unemployment was as on March 2017 is 5%.

India has main industries of software, petroleum products, chemicals, agriculture, textiles, steel, transport equipment etc. India has largest growing service sector with an annual growth of 9% per year since 2001. It is the largest exporter of information technology (IT) services, software services, agriculture, leather, jewellery, textiles, chemicals, and ores. Its major export partners are European Union (16.9%), United States (15.2%), United Arab Emirates (11.3%) and Hong Kong (4.6%).

1.5.4 CHINA

Chinese currency is Renminbi Yuan. The central bank of China is People's Bank of China. Chinese economy is considered as the largest in the world by purchasing power parity. Chinese public sector has a bigger share than private sector. China is largest manufacturing country in the world and is the biggest manufacturing hub. China is second largest importer in the world and has largest manufacturing market. GDP's share from service sector is 50.5 %. Unemployment was as on March 2017 is 4.1%

It mainly exports electrical and other machinery, including data processing equipment, apparel, textiles, iron and steel etc and also all categories of industrial products. Its major export partners by 2014 are United States (16.9%), Hong Kong (15.5%), Japan (6.4%), and South Korea (4.3%). Its major import goods are electrical & other machinery, oil & mineral fuel, optical & medical equipment, metal ores, plastic and organic chemicals. Its major

import partners are South Korea (9.7%), Japan (8.3%), United States (8.1%), Taiwan (7.8%), Germany (5.4%), and Australia (5%).

1.5.5 SOUTH AFRICA

South African currency is South African rand. South Africa is only African country among G20 nations. Johannesburg is the financial capital of South Africa. Countries strong banking system was considered a positive point for the economy. Major challenges seen by South Africa are inefficient bureaucracy, restrictive labor regulations, shortage of educated workers, political instability and corruption. Unemployment was as on March 2017 is 27.1%.

South Africa is major exporter of gold, diamond, platinum, other metals and minerals, machinery and equipment. Main export partners are China (14.5%), United States (7.9%), Japan (5.7%), Germany (5.5%), India (4.5%), and United Kingdom (4.1%). It imports goods such as machinery and equipment, chemicals, petroleum products, scientific instruments, foodstuffs. Its main import partners are China (14.9%), Germany (10.1%), United States (7.3%), Saudi Arab (7.2%), and India (4.6%)

CHAPTER 2

LITERATURE REVIEW

The paper studies various components like maternal mortality ratio (MMR), life expectancy at birth, gross national income (GNI), population, and improved sanitation facility. Various other researchers who came up are:-

According to Varma (Year) that China does not believe in balanced growth and its investment led growth could not sustain for long. The investment by China has led to lot of bad debts for the .country. However, China has potential to absorb it and rectify if required. China's per capita GDP is now 18% while it is expected to reach 8% in next 10 years. China was major driver of BRICS. Without this, other countries would only be a soft brand of cheese. Economists believe that BRICS will soon require reviving its strategies.

It was looked up for becoming the front ranked country. Growth of BRICS made several changes in the world economy where labor and manufacturing cost come down and prices of goods increase. Because of large and cheap labor in the market has led to wage stagnation which has created income disparity. Year on Year growth rate is decreasing for BRICS. In 2013, IMF reports states that China would grow by 7.8%, India by 5.6% and Russia by 2.5%.

Neill (2001) observed that China being forth and India being second largest economy which is even bigger than Canada. China is four times bigger than Italy which means policy change impact could be more in China than Italy. The explanatory monetary & fiscal policy could have more impact on China.

Hasan and Luthra (2011) states that China overpowered India only in psychology, mathematics, engineering and physical science. Russia was above India in all the subjects except agriculture science, computer science and medical science. South Africa was ahead only in psychology while Brazil was below India in all subjects. Publishing science and engineering research paper is low in other countries except BRICS. China's maximum growth in research paper is in area of agriculture and minimum in areas of social science. India has achieved maximum growth rate in area of engineering. Brazil had maximum paper published in agriculture science whereas Russia and South Africa in computer science. China is leading in producing doctorates in science and engineering followed by Russia, India, Brazil and South Africa. Brazil is likely to experience 'G7 style' growth.

China's experience on research and development (R&D) has increased. India is second after China in publications of software and engineers and its expenditure on R&D was more than Brazil, Russia and South Africa but very low from China. Expenditure on R&D was higher which has impacted publications in science & engineering research papers and could manage to achieve second position after USA.

Wilson and Purushothaman (1st October 2003) predicted GDP growth, per capita income and currency movement of BRICS's economics until 2050. This gives a real picture of how the world would change in years to come. It was suggested that if everything goes well India's economy would be larger than Japan by 2032 and china larger than US by 2041 and BRICS would be larger than together G6 nations by 2039. BRICS would be larger than G6 in US dollar terms. By 2025 it would be over half the size of G6. In US dollar terms, china would overtake US by 2039 and Russia would overtake Germany, France, Italy and UK. Out of current G6 (US, Japan, Germany, France, Italy, UK) only US and Japan would be sixth largest economy in US dollar terms by 2050. India is expected to be the fastest growing economies in the world in the next 30-50 years. Growth would be higher than 5% in 30 years and closer to 5% as late as 2050.

Growth of BRICS is likely to reduce in coming years. By 2050, India projects growth rate above 3%. In 2009 annual income in US $ spending of BRICS is more than G6. By 2025 the annual in USA dollar spending would be twice as G6 and four times higher than 2050. In next 50 years, BRICS real exchange rate would increase by 300%. If China's exchange rate is allowed to float China's currency would double in next 10 years. Within 10 years BRICS have put a strong foot in world economy.

Directorate General for External Policies of the Union (April 2012)- Directorate studies the role of BRICS in developing world. It examines that within 10 years BRICS have manufactured a strong portion in the world. BRICS participation in gross national income (GNI) shows that China, India and other middle income countries would further expand their share. Brazil is stable and RUSSIA's share is expected to decline in future. By 2015, middle income countries (MIC's) and BRIC are expected to produce more than 50% of world's share. India has moved from lower income country (LIC's) to higher income countries (HIC's) and almost all BRICS are facing poverty accomplished by great disparity. However, because of their strong economic and dynamic as well as territorial and demographic dimension BRICS influence economic development.

BRICS have started to hold a strategic alliance with meetings at ministerial and presidential level. This was done with the objective to gain influence in institutions of global governance. Their strategy is based on multilateral soft and balancing. This gives an important impact on international architecture and should be taken seriously while formulating European Union (EU) development goals.

CHAPTER 3

OBJECTIVE AND RESEARCH METHODOLOGY

3.1 OBJECTIVES OF THE STUDY

The study was undertaken with the following objectives:-

1) To analyse the growth trends of BRICS nations.

2) To identify life expectancy at birth, maternal mortality rate (MMR), gross national income (GNI), population and improvement in sanitation facilities of BRICS countries.

3) To find out relation between gross national income (GNI) with population, life expectancy at birth, maternal mortality rate (MMR), and improvement in sanitation facility.

3.2 DATA AND VARIABLES OF THE STUDY-

In the present study, annual data of BRICS economies from the period of 1990-2014 have been collected. Collected data are related to following variables:

1) Gross national income (GNI).

2) Population.

3) Life Expectancy at Birth.

4) Maternal mortality rate(MMR).

5) Improved sanitation facility (% of people having access)

3.3 RESEARCH DESIGNS AND METHODS-

Data source-The entire data used in the study have been collected from data published in Bluenomics. Collected data of BRICS nations is related to different economic variables used in the study. Year on year growth rate is calculated for different countries on different components growth tends to analyze how much the economy is growing based on various aspects. The compound growth rate is also calculated for the entire study period. These growth rates provide a better picture and give good comparison among BRICS economies. The analysis of these aspects gives us the idea of how important these variables are for the development of the country.

Also, with a view of achieving the second objective of the study we run multiple regression. This was basically done for finding the relationship between the variables viz. population, life expectancy at birth, maternal mortality rate and improved sanitation facility (% of population with access) with gross national income (GNI).

Multiple regression is basically an extension of simple regression model. In the simple regression there is only one dependent and one independent variable. On the other hand in multiple regressions there are multiple or more than one independent or explanatory variables and only single dependent variable. In the present study there are also more than one independent variables and one dependent variable i.e., gross national income (GNI). Further, step regression was run which helped in choosing significant variables which affect GNI of BRICS nations. Statistical Software SPSS version 20 has been used to analyze the data. The problem of multi collinearity was ruled out with regression and all the insignificant variables were excluded. The regression line important for analysis is :-

O= f (Lm, Lf, P)……. (i)

O = GNI

Lm = life expectancy at birth

Lf = life expectancy at birth female

P = population

CHAPTER 4

DATA ANALYSIS AND RESULTS

This Chapter presents data analysis and results for BRICS economies. Section 4.1, 4.3, 4.5, 4.7, and 4.9 present the year on year growth rate life expectancy at birth, Maternal Mortality, Improved sanitation and Gross National Income for all the BRICS economies. Section 4.2, 4.4, 4.6, 4.8 and 4.10 presents the regression results. Finally there are sections 4.11 a-e presenting compound annual growth rates for all the variables included in the study.

4.1 Brazil

Brazil life expectancy, Maternal Mortality, Sanitation facility and Gross National Income year on year growth rates are presented in Section 4.1 a- e.

4.1 a Brazil : Life Expectancy Scenario

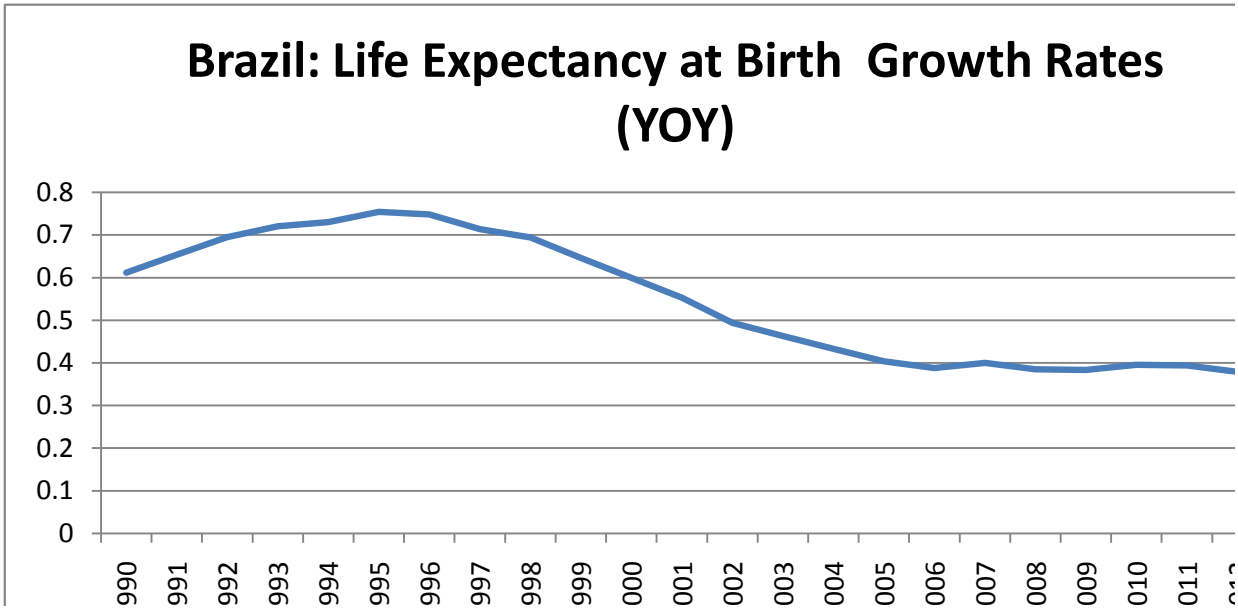

Figure 4.1 a Brazil Life Expectancy Scenario

Brazil life expectancy at birth year on year growth rates (figure 4.2 a) show downward sloping trend. The curve started from 1990 where the growth in life expectancy at birth is around 0.61% and is continuously rising. It was maximum 1995 which was about 0.75%. After reaching maximum it started declining. In 2006it was 0.38%. Economic crises, lower income and deteriorating quality of life in the country have had impact on health.

4.1 b Brazil: Maternal Mortality Scenario

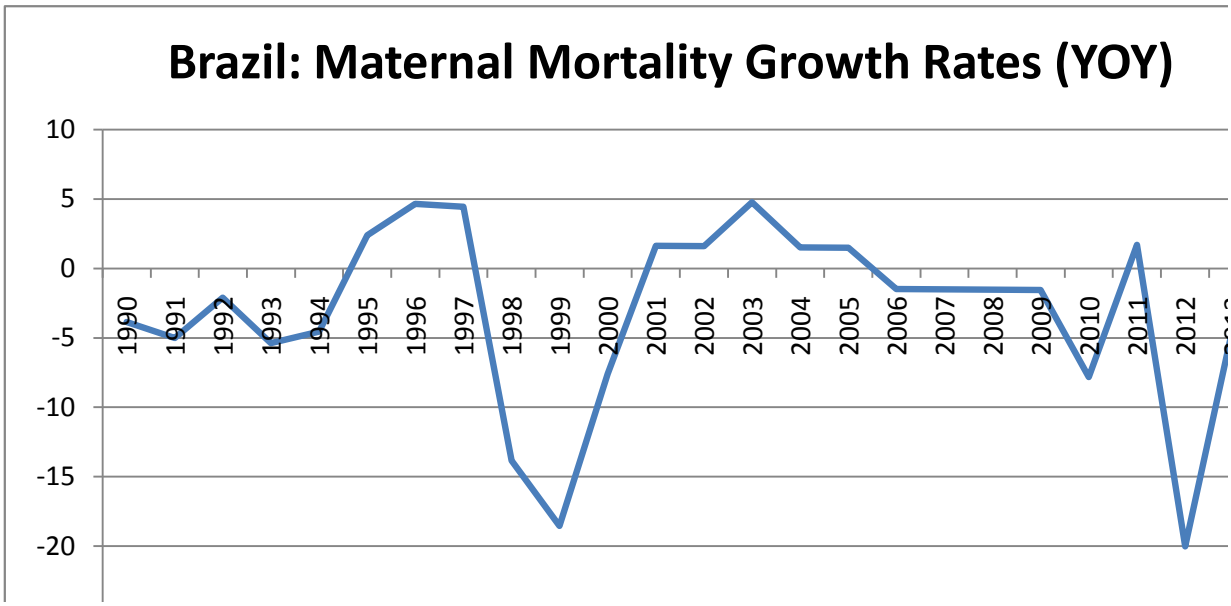

Figure 4.1 b Brazil: Maternal Mortality Scenario

Brazil Maternal mortality growth rate (Figure 4.1 b) around -3.84% in 1990. Maternal mortality rate was negative until 1994. It started growing soon after and reached maximum up to 4.65% in 1996. Soon after reaching maximum it started declining and reached minimum in 1999 to -18.52%. After that it was increasing and was positive in 2001. But in 2006 it again decelerated to -1.47%. It was minimum in 2012 by -20%. Few main reasons for death are edema, hypertensions, and proteinuria.

4.1 c Brazil: Improved Sanitation Facility Scenario

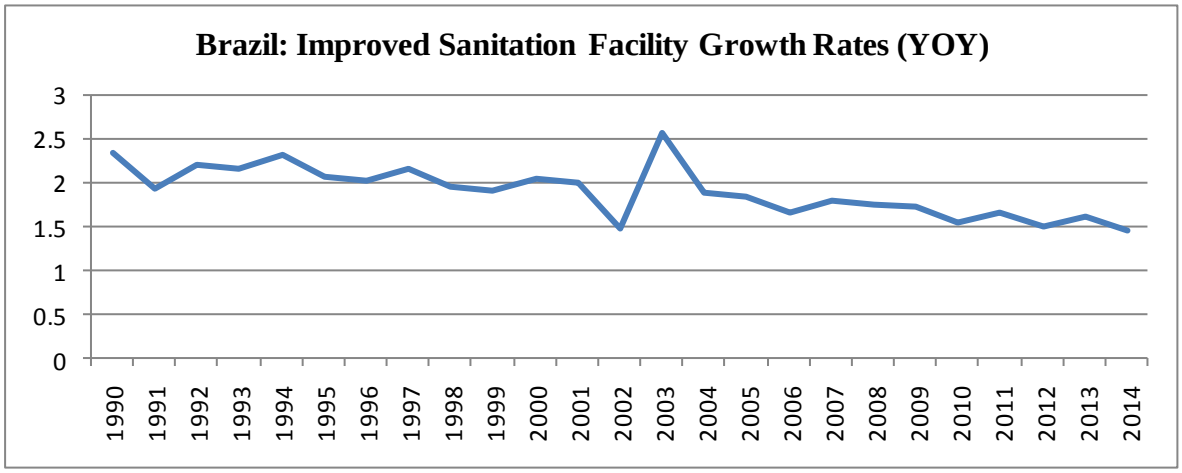

Figure 4.1 c Brazil: Improved Sanitation Facility Scenario

% of people accessing the improved sanitation facility (Figure 4.1 c) in Brazil is growing. It started from 1990 which was around 2.32%. In 2002, Brazil had minimum sanitation facility which was around 1.48%. After that it increased and reached maximum in 2003 around

2.55%. During the economic crises of 2007-08, there was very little change in growth rate. Then it started decreasing but could manage to remain positive.

4.1 c Brazil: Gross National Income (GNI) Scenario

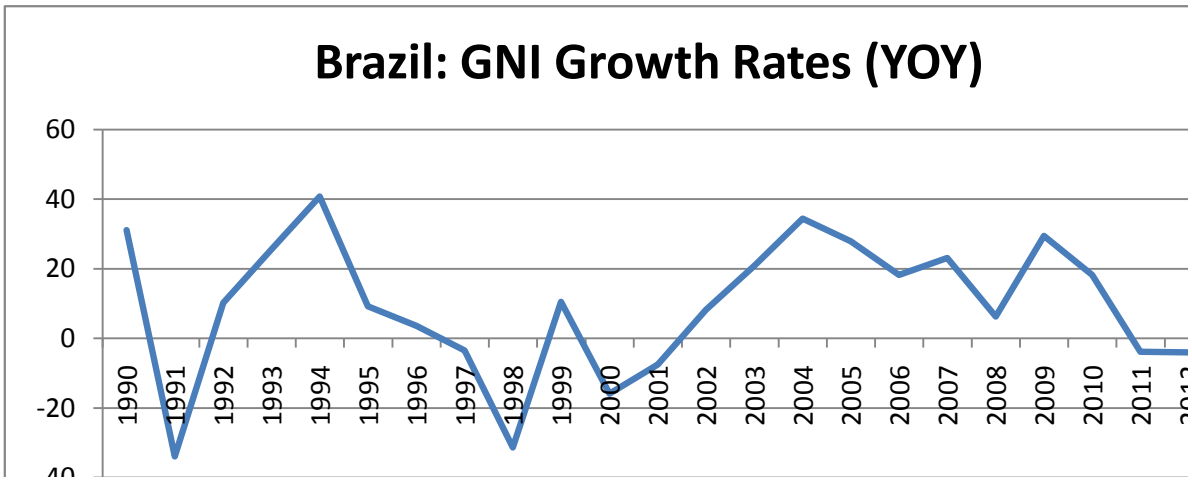

Figure 4.1 d Brazil: Gross National Income Scenario

Brazil GNI growth rates as shown in Figure 4.2 d showed a lot of fluctuations. In 1990 it was 31.11%. It went on decreasing and reached the lowest point in 1991 to -33.89%. It again started increasing at a high speed and was maximum in 1994, which was about 40.74. It again became negative and remained negative till 2001.Fall in accumulation of capital could be the reason for fluctuations in GNI. It could manage to increase and went to positive only once during the entire period at 10.52% in 1999. After 2002 it remained positive till 2010. It was maximum in 2005 which was around 27.90%. It was again negative in 2011.

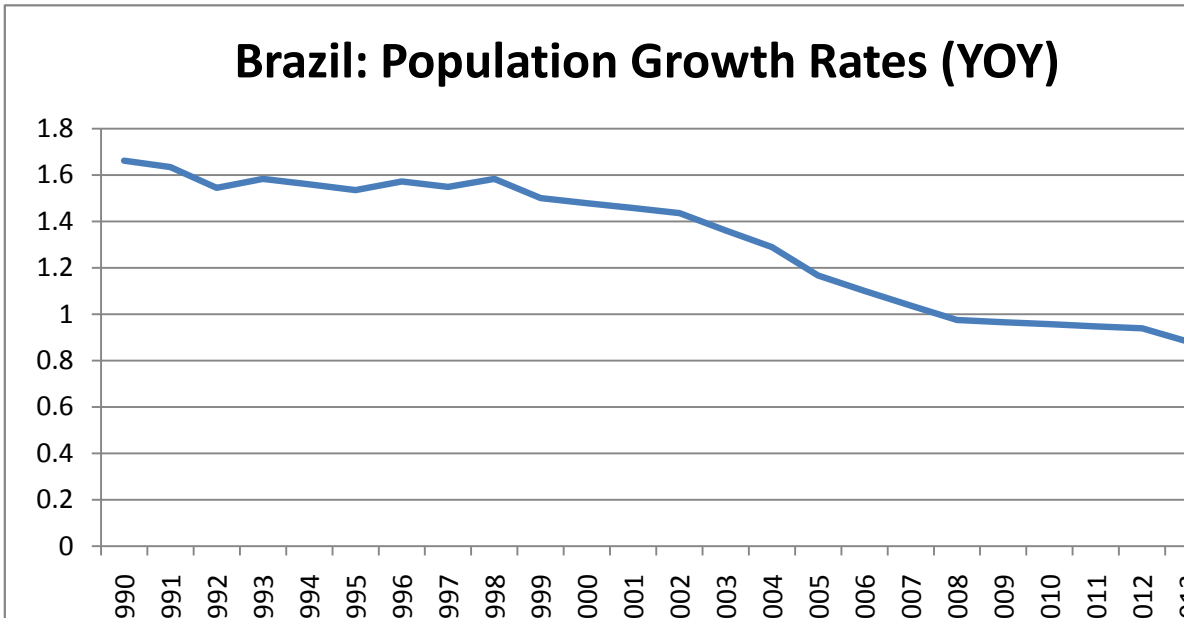

Figure 4.1 e Brazil: Population Scenario

Brazilian population growth (Figure 4.1 e) was 1.66% in 1990. However Brazilian population growth rate showed a downward trend. It was however positive throughout. In 1990 the growth rate of population was maximum at 1.66% and was minimum in 2014 to 0.82%.

4.2 Relation of Brazil GNI with Life Expectancy, Maternal Mortality rate, Improved Sanitation facility and Population

Relation of Brazil GNI with Life Expectancy, Maternal Mortality rate, Improved Sanitation facility and Population was done through multiple regression. GNI was the dependent variable and Life Expectancy, Maternal Mortality rate, Improved Sanitation facility and Population were the independent variables. The results are presented in Section 4. 2 a-c.

Table 4.2 a Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.854[a]	.730	.718	.39250
2	.968[b]	.937	.932	.19328
3	.975[c]	.951	.944	.17545
a. Predictors: (Constant), brazil improved sanitation facility				
b. Predictors: (Constant), brazil improved sanitation facility, BP				
c. Predictors: (Constant), brazil improved sanitation facility, BP, brazil MMR				

In this model, (4.2 a) 95.1% of variation in GNI is explained by improved sanitation facility, population and maternal mortality rate. In this model adjusted R square is 94.4% which states that independent variable i.e. improved sanitation facility, population and maternal mortality rate explains 94.4% variation in GNI. If only two variables are taken i.e. sanitation facility and population then adjusted R square is 93.2% and when all the three variables are taken then adjusted R square increases to 94.4%.

Table 4.2 b: ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	9.588	1	9.588	62.235	.000[b]
	Residual	3.543	23	.154		
	Total	13.131	24			

2	Regression	12.309	2	6.155	164.750	.000[c]
	Residual	.822	22	.037		
	Total	13.131	24			
3	Regression	12.485	3	4.162	135.199	.000[d]
	Residual	.646	21	.031		
	Total	13.131	24			
a. Dependent Variable: Brazil GNI						
b. Predictors: (Constant), brazil improved sanitation facility						
c. Predictors: (Constant), brazil improved sanitation facility, BP						
d. Predictors: (Constant), brazil improved sanitation facility, BP, brazil MMR						

The table 4.2 b shows F- statistic which is about 135.199 and is significant. Hence, the model is acceptable. Here we will reject the null hypothesis because the calculated value is greater than the critical value.

Table 4.2 c Coefficients

Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**T**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	-3.426	.579		-5.915	.000
	brazil improved sanitation facility	.074	.009	.854	7.889	.000
2	(Constant)	11.571	1.780		6.500	.000
	Brazil improved sanitation facility	.631	.065	7.310	9.641	.000
	BP	-.274	.032	-6.471	-8.535	.000
3	(Constant)	7.321	2.404		3.045	.006
	Brazil improved sanitation facility	.591	.062	6.842	9.563	.000
	BP	-.242	.032	-5.722	-7.565	.000
	Brazil MMR	.014	.006	.307	2.387	.026
a. Dependent Variable: Brazil GNI						

Brazil (GNI) = 7.321 + 0.591(improved sanitation) – 0.242(pop) + 0.014(MMR)

(3.04) (9.56) (7.56) (2.38)

As shown through Table 4.3 c, when improved sanitation is increased by 1%, keeping the population and MMR constant the, GNI of Brazil will increase by 59.1%. When improved sanitation and MMR are held constant and population decreases by 1 %, the GNI will

decrease by 24.2%. When improved sanitation and population is held constant and MMR increases by 1% GNI will increase by 1.4%.

4.3 Russia

Russia's life expectancy, Maternal Mortality, Sanitation facility and Gross National Income year on year growth rates are presented in Section 4.2 a- e.

4.3 a Russia: Life Expectancy Scenario

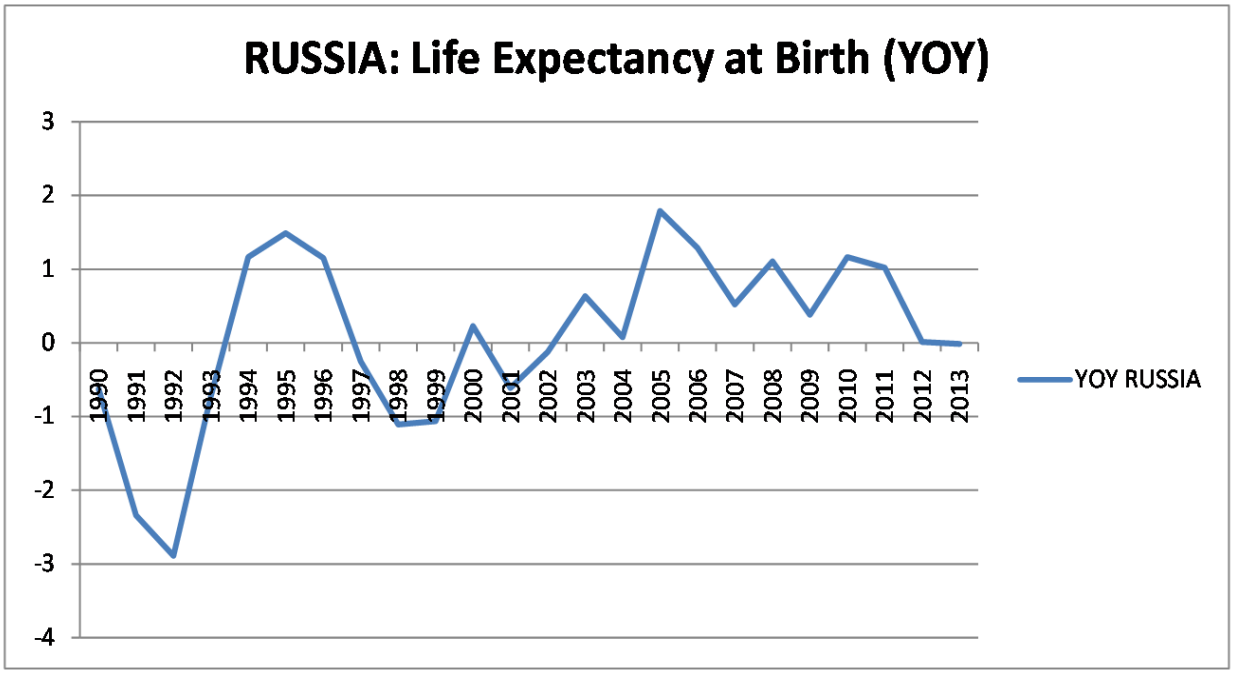

Figure 4.3 a Russia Life Expectancy Scenario

Russia life expectancy at birth (Figure 4.3 a) growth rate decreased in 1990 and was negative at -0.62%. It was minimum in 1992 i.e. -2.88%. After 1992 it increased sharply. It reached maximum in 1995 at 1.48%, after becoming positive in 1994. It again decelerated in 1997 and remained negative till 2002. It could barely touch the positive mark in 2000 by 0.22%. After 2002 it remained positive. It was highest in2005, about 1.78% and again decreased in 2013.

4.3 b Russia: Maternal Mortality Scenario

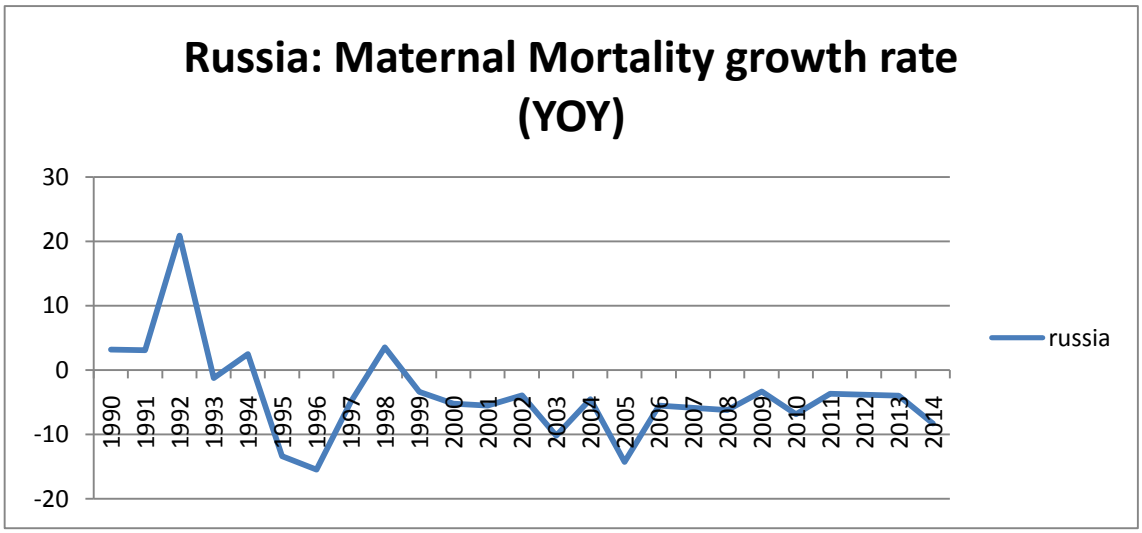

Figure 4.3b Russia: Maternal Mortality Scenario

Russia's maternal mortality (Figure 4.3b) growth rate was 3.17 in 1990. In 1992 it increased to 20.89%. It was negative in 1993 at -1.23%, but could manage to increase and became positive in 1994. MMR growth rate again went down to become negative in 1995 to -13.41% and remained negative till 1997. It was minimum in 1996 at -15.49%. MMR again became positive in 1998 at 3.50%. After being positive in 1998 it decelerated till 2014.

4.3 c Russia: Gross National Income (GNI) Scenario

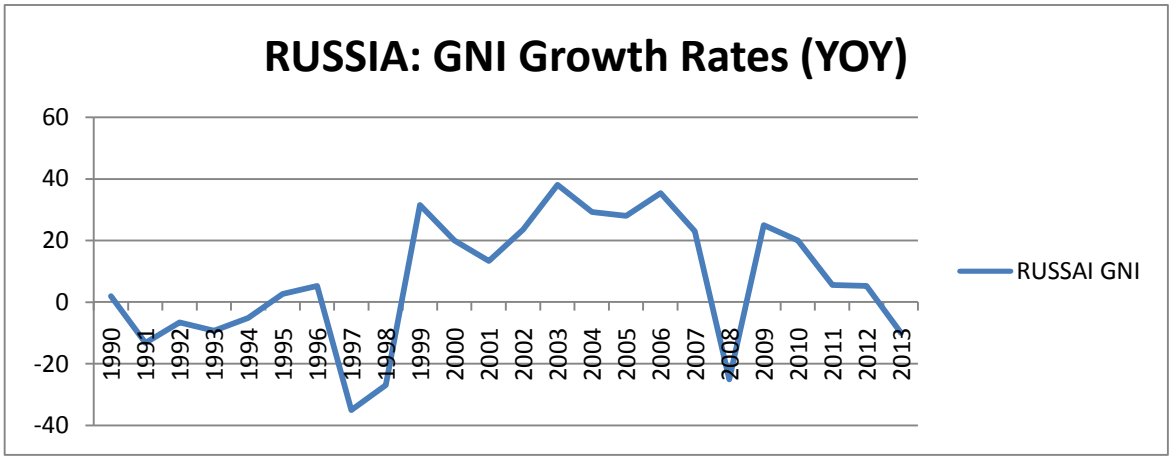

Figure 4.3 c Russia: Gross National Income Scenario

Russia's GNI growth rate (Figure 4.3 c) showed a lot of fluctuations. It fell down in 1990 and became negative to about -13.20 in 1991. It continued to be negative till 1998. It was positive only in 1995 and 1996. Then growth rate increased sharply and became positive in 1999. Fluctuation continued in GNI until 2007 after which it became negative in 2008 to -25%, but

it soon increased at a very high rate and was 25% in 2009. Again in 2010 it slowly reduced after reaching the peak in 2009 and was negative till 2014.

4.3 d Russia: Population Scenario

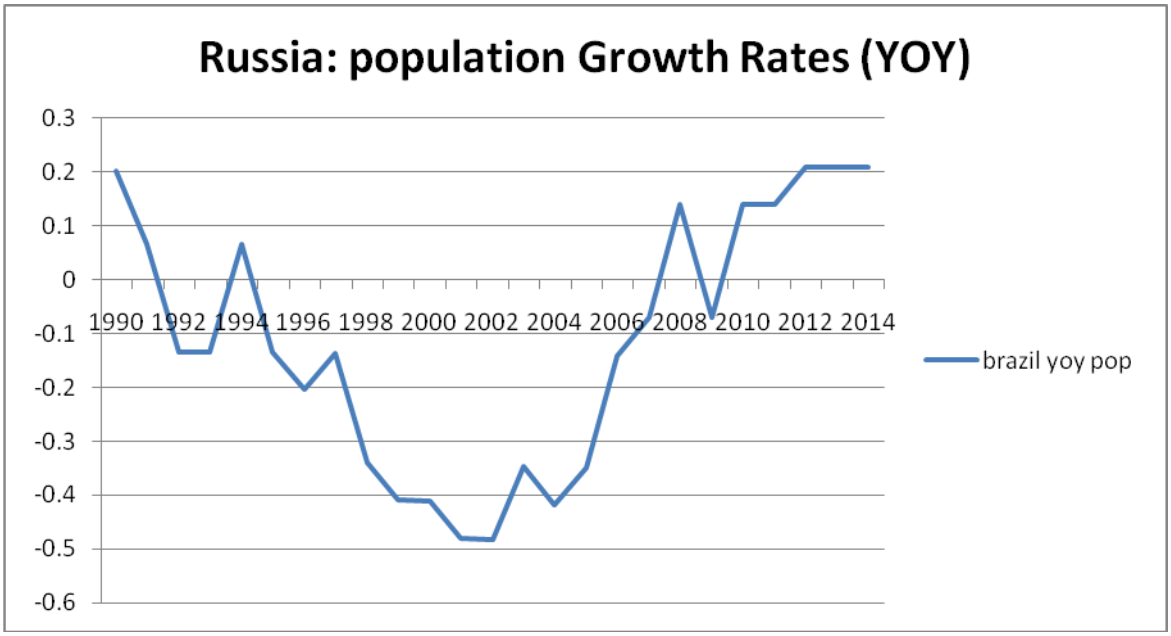

Figure 4.3 d Russia: Population Scenario

Russia's population growth rate as shown in Figure 4.3 d, decreased till 1993. In 1990 it was 0.20%. But it was negative at -0.13% in 1992. It became positive in 1994. But, soon after that in 1995 it became negative and continued to be negative till 2007. From 2008 onwards it remained positive but once in 2009 the growth rate went negative to decrease to 0.06%. Again it started growing after that.

4.4 Relation of Russia GNI with Life Expectancy, Maternal Mortality Rate, Improved Sanitation Facility and Population

Relation of Russia GNI with Life Expectancy, Maternal Mortality rate, Improved Sanitation facility and population was done through multiple regression. GNI was a dependant variable and Life Expectancy, Maternal Mortality rate, Improved Sanitation facility and population were independent variables. The results presented below:-

Table 4.4 a Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	.839[a]	.703	.691	.33905
2	.910[b]	.828	.813	.26389
3	.961[c]	.924	.913	.17988
a. Predictors: (Constant), Russia MMR				
b. Predictors: (Constant), Russia MMR, Russia LEB				
c. Predictors: (Constant), Russia MMR, Russia LEB, RP				

In this model, 92.4% of variation in GNI is explained by maternal mortality rate, population and life expectancy at birth rate. In this model adjusted R-square is 91.3%, which states that independent variable i.e. life expectancy at birth, population and maternal mortality rate explains 91.3% variation in GNI. If only two variables are taken i.e. maternal mortality rate and life expectancy at birth rate is taken then adjusted R square is 81.3% and when all the three variables are taken then adjusted R square increases to 91.3%.

Table 4.4 b ANOVA[a]						
Model		**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**
1	Regression	6.272	1	6.272	54.559	.000[b]
	Residual	2.644	23	.115		
	Total	8.916	24			
2	Regression	7.384	2	3.692	53.017	.000[c]
	Residual	1.532	22	.070		
	Total	8.916	24			
3	Regression	8.237	3	2.746	84.853	.000[d]
	Residual	.679	21	.032		
	Total	8.916	24			
a. Dependent Variable: RG						
b. Predictors: (Constant), Russia MMR						
c. Predictors: (Constant), Russia MMR, Russia LEB						
d. Predictors: (Constant), Russia MMR, Russia LEB, RP						

Table 4.4 b shows F- statistic is 84.853. The value is significant, hence, the model is acceptable. Here we will reject the null hypothesis because the calculated value is greater than the critical value.

Table 4.4 c Coefficients[a]

Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**T**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	2.184	.196		11.140	.000
	Russia MMR	-.027	.004	-.839	-7.386	.000
2	(Constant)	-8.643	2.714		-3.185	.004
	Russia MMR	-.017	.004	-.514	-4.287	.000
	Russia LEB	.154	.038	.479	3.996	.001
3	(Constant)	26.294	7.053		3.728	.001
	Russia MMR	.031	.010	.962	3.217	.004
	Russia LEB	.297	.038	.927	7.755	.000
	RP	-.322	.063	-1.258	-5.133	.000
a. Dependent Variable: RG						

Russia (GNI) = 26.294 + .031(MMR) + .297(LEB) - .322(population)

3.728 3.217 7.755 5.133

As shown through table 4.4 c, keeping LEB and population constant, if MMR increases by 1% Russia's GNI will increase by 0.031%. When LEB is increased by 1%, then GNI of Russia is increased by 0 .297. Keeping the MMR and LEB constant and if population is decreased by 1% then the Russia GNI decreases by 5.13.

4.5 India

India's life expectancy at birth, Maternal Mortality, Sanitation facility and Gross National Income year on year growth rates are presented below in section 4.5 a-e:-

4.5 a India: Life Expectancy Scenario

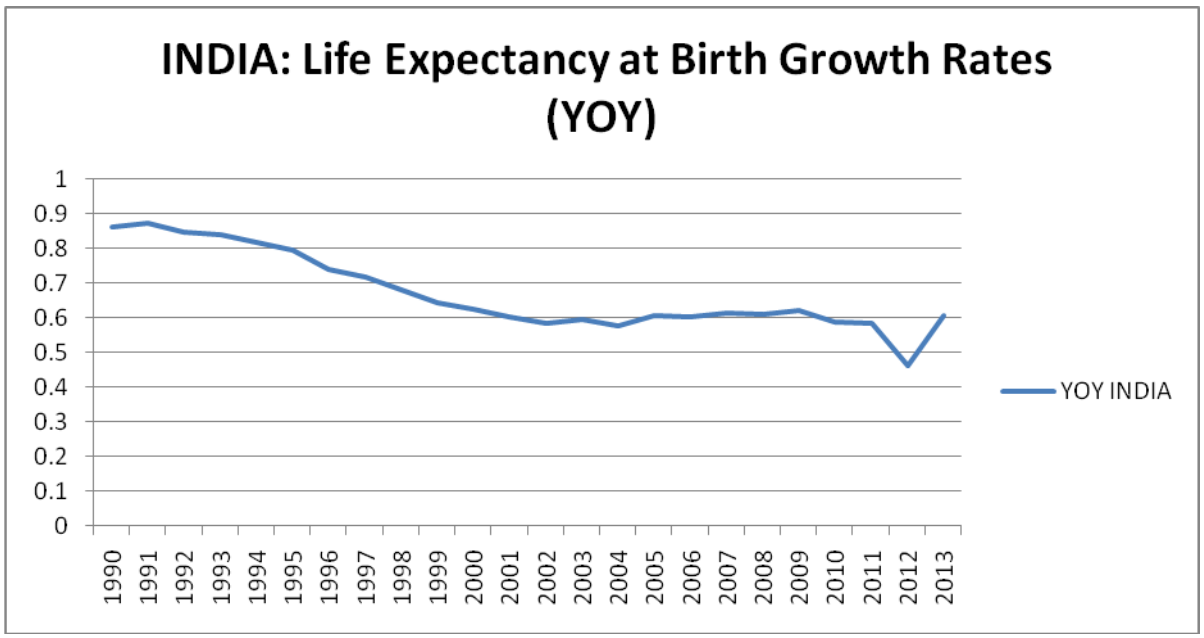

Figure 4.5 a India Life Expectancy Scenario

India's life expectancy at birth (Figure 4.5 a) growth rate is decreasing. In 1990, growth rate was around 0.86% , but increased to 0.87% in 1991. After 1996 there was declined rapidly till 2002. In 2003, there was little hike in growth rate to 0.59%. After that it again fell down in 2004 to 0.57%. It grew gain to fall, but with very little fluctuations. There was z greater decline in growth rate by 0.46%. Continuous supply of food is main reason for increase in life expectancy at birth. Supply of clean drinking water and control over non communicable disease also played a major role.

4.5 b India: Maternal Mortality Rate

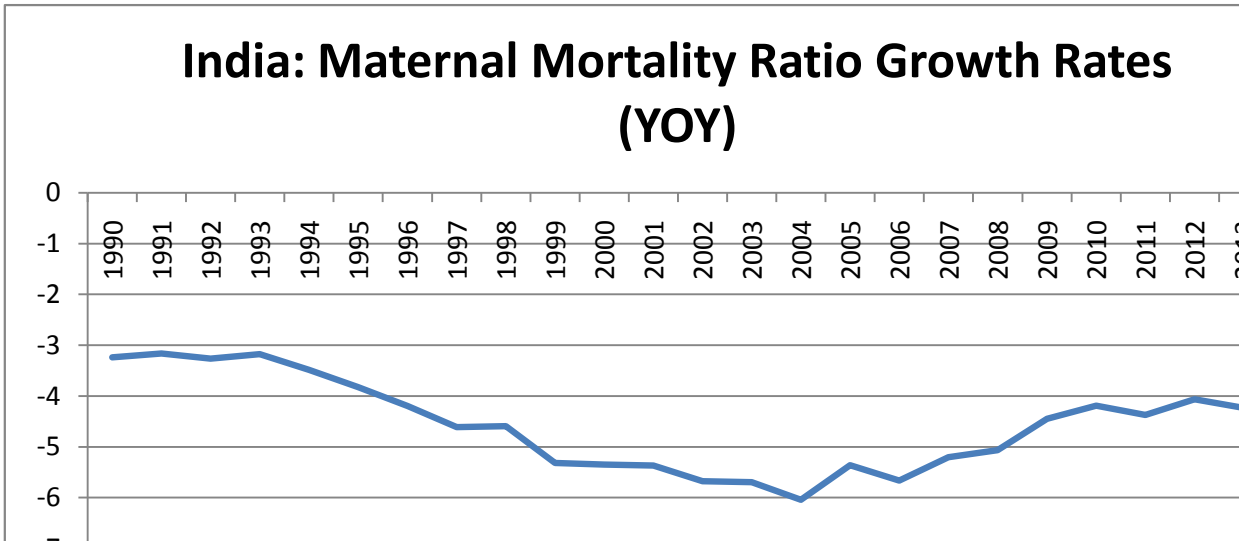

Figure 4.5 b India: Maternal Mortality Rate

India's maternal mortality growth rate is -3.23% in 1990 as shown in Figure 4.5 d. But the entire period shows negative growth rate. Lowest growth rate was in 2004 at -6.04%. In 2014 it was -3.86. India is presented as a country which faces major challenges from maternal mortality rates and other infectious diseases, but today it is facing newer challenges of heart stoke, obesity, cancer and diabetes.

4.5 c India: Gross National Income (GNI) Scenario

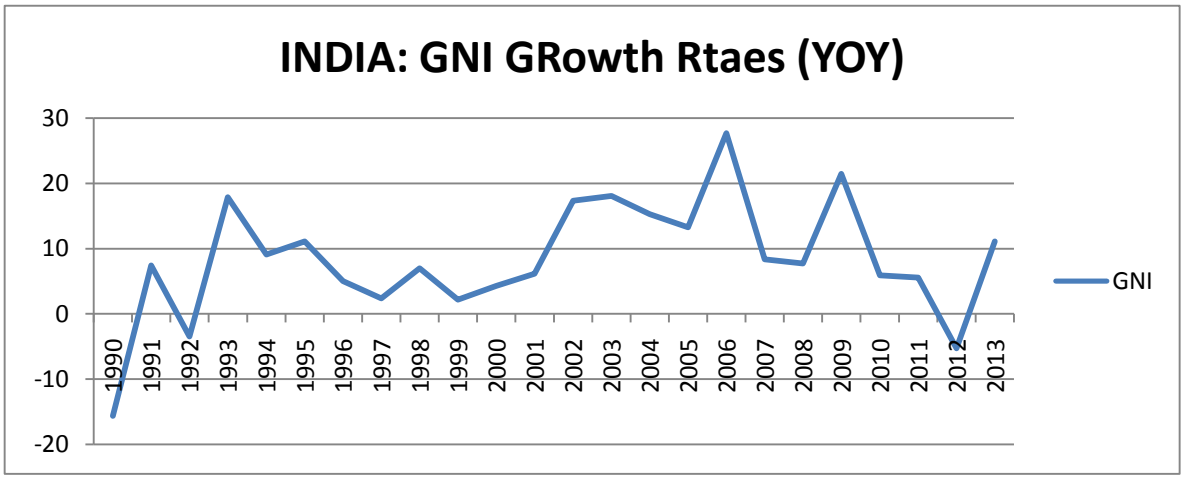

Figure 4.5 c India: Gross National Income (GNI) Scenario

India's GNI growth rates are shown in Figure 4.4 c. It depicts a lot of fluctuations. It was negative in 1990 at 15.62%. After 1990 it started rising and in 1991 it was 7.40%. In 1992 it again fell down to -3.44%. From 1993 to 2011 it was positive. During this entire phase it was maximum in 2006 at 27.65%. In 2012, it was negative and was -5.26%. Soon after 2012 the country could manage to recover itself.

4.5 d India: Population Scenario

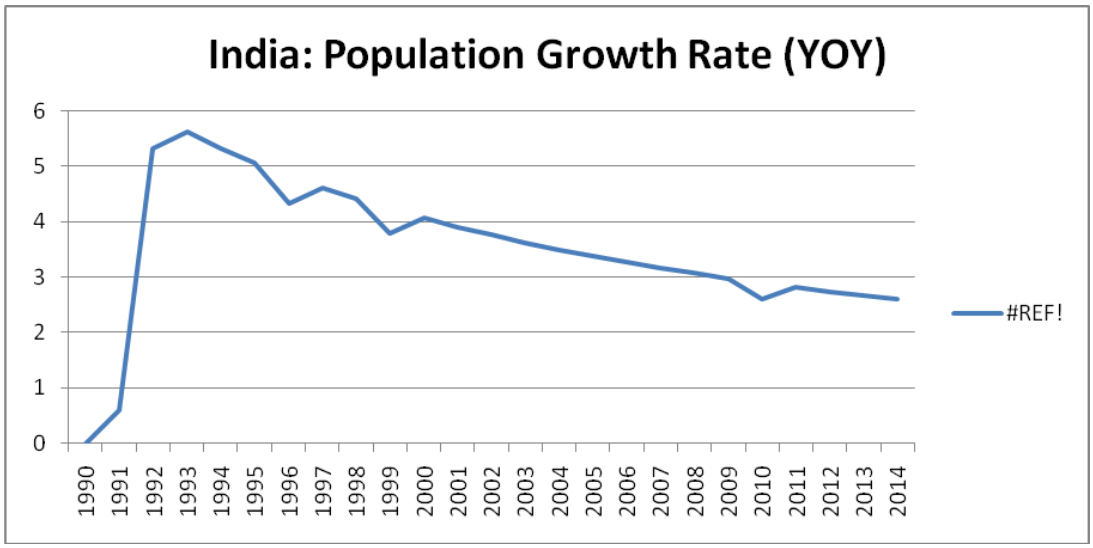

Figure 4.5 d India Population Scenario

India's population growth rate was very low in 1990 i.e. about 2.05%.There was rapid increase in population till 1992 as seen in the graph by upward slope of curve. It decreased from 1993 which is clear from a downward sloping trend. Except for three major bumps where the growth rate of population increased and decreased, viz. From 1995-97; From 1998-2000; and From 2009-2011. Except for these it was continuously falling.

4.5 e India: Improved Sanitation Facility

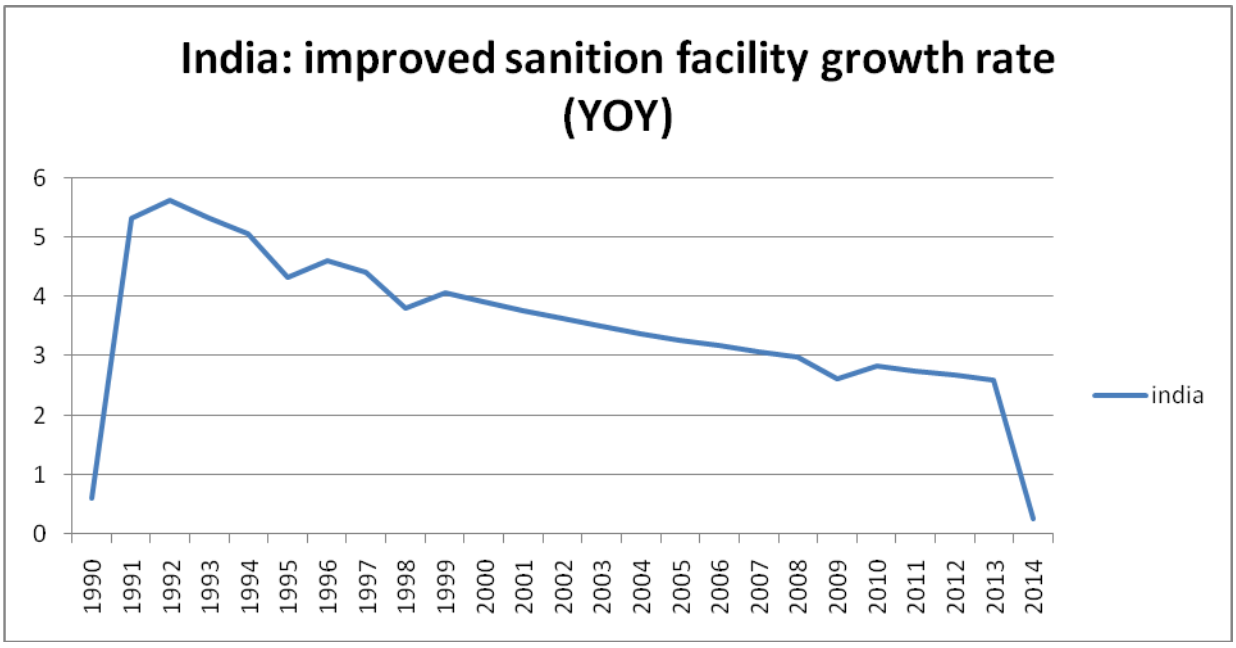

Figure 4.5 e India: Improved Sanitation Facility

Figure 4.5 e depicts improved Sanitation Facility of India. In India percentage of people having access to improved sanitation grew from 1990 till 1992. It was 0.59% in 1990. It grew at a massive rate till 1992 and became 5.61. It went declining more or less at a constant rate. The growth was least in 2009 at 2.60%. After 2013, it decelerated with high speed and reached 0.25% in 2014 compared to 2.59 in 2013.

4.6 Relation of India GNI with Life Expectancy, Maternal Mortality Rate, Improved Sanitation Facility and population

Relation of India GNI with Life Expectancy, Maternal Mortality Rate, Improved Sanitation Facility and Population was done with multiple regression. GNI was dependant variable and Life Expectancy, Maternal Mortality rate, Improved sanitation facility and population were dependant variables. The results are presented in Section 4.6 a-c.

Table 4.6 a Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	.936[a]	.876	.870	.21464
2	.979[b]	.959	.955	.12616
3	.984[c]	.968	.963	.11465
a. Predictors: (Constant), India improved sanitation facility				
b. Predictors: (Constant), India improved sanitation facility, India MMR				
c. Predictors: (Constant), India improved sanitation facility, India MMR, India LEB				

In this model **(Table 4.6 a)** 96.8% of variation in GNI is explained by improved sanitation facility, population and maternal mortality rate. In this model adjusted R square is 96.3% which states that independent variable i.e. improved sanitation facility, population and maternal mortality rate explains 96.3% variation in GNI. If only two variables are taken i.e. sanitation facility and maternal mortality rate then adjusted R square is 95.5% and when all the three variables are taken then adjusted R square increases to 96.3%.

Table 4.6 b ANOVA[a]						
Model		**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**
1	Regression	7.468	1	7.468	162.110	.000[b]
	Residual	1.060	23	.046		
	Total	8.528	24			
2	Regression	8.178	2	4.089	256.920	.000[c]
	Residual	.350	22	.016		
	Total	8.528	24			
3	Regression	8.252	3	2.751	209.252	.000[d]
	Residual	.276	21	.013		
	Total	8.528	24			
a. Dependent Variable: IG						
b. Predictors: (Constant), India improved sanitation facility						
c. Predictors: (Constant), India improved sanitation facility, India MMR						
d. Predictors: (Constant), India improved sanitation facility, India MMR, India LEB						

Table 4.6 b shows F-statistic is 209.252. The value is significant. Hence, the model is acceptable. Thus, we will reject the null hypothesis because the calculated value is greater than the critical value.

Table 4.6 c Coefficients

Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**T**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	-1.299	.174		-7.461	.000
	India improved sanitation facility	.078	.006	.936	12.732	.000
2	(Constant)	-11.235	1.492		-7.532	.000
	India improved sanitation facility	.284	.031	3.420	9.131	.000
	India MMR	.012	.002	2.500	6.677	.000
3	(Constant)	8.109	8.260		.982	.337
	India improved sanitation facility	.368	.045	4.438	8.106	.000
	India MMR	.009	.002	1.860	4.283	.000
	India LEB	-.326	.137	-1.659	-2.374	.027

Dependent Variable: IG

India(GNI) = 8.10 + .368 (improved sanitation facility) + .009 (MMR) - .326 (life expectancy at birth)

(.982) (8.106) (4.28) (2.374

If improved sanitation facility is increased by 1%, then Indian GNI is increased by.368 keeping MMR and life expectancy at birth constant. When improved sanitation facility and life expectancy are held constant and MMR is increased by 1%, then Indian GNI will be increased by 4.28. If life expectancy is decreased by 1% then Indian GNI decreases by -.326 keeping MMR and improved sanitation held constant.

4.7 CHINA

China life expectancy, maternal mortality, sanitation facility and Gross national income year on year growth rate are presented in section 4.7 a-e.

4.7 a China: Life expectancy scenario

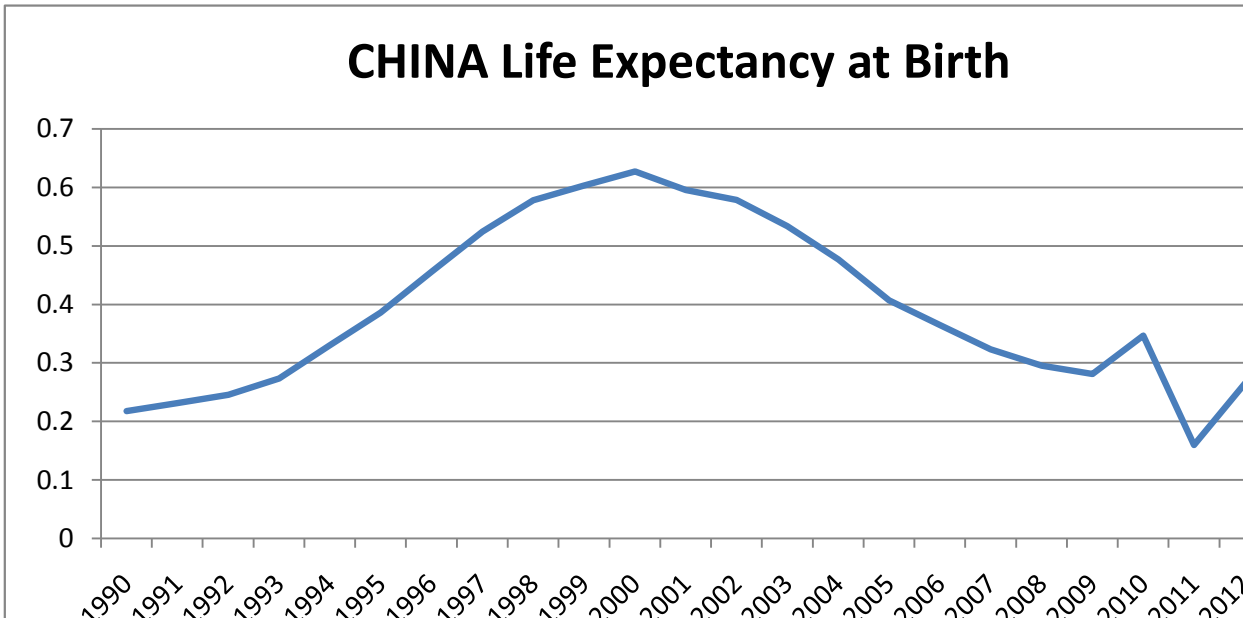

Figure 4.7 a China: life expectancy Scenario

China's life expectancy (Figure 4.7 a) at birth in 1990 was 0.21%. After that it increased steadily. It was highest in 2000 which was 0.62%. It went down decreasing and reached 0.28% in 2009. It went up soon after that and reached the tip in 2010 which was around 0.34%. It went down and reached minimum in 2011 at 0.15%.

4.7 b China: Maternal Mortality Scenario

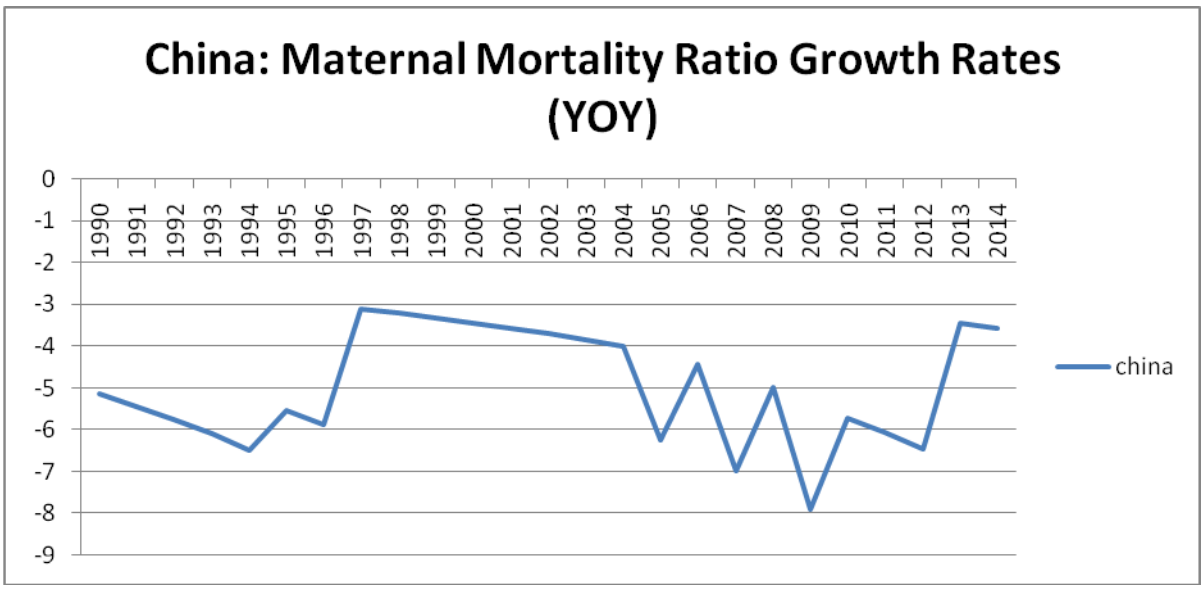

Figure 4.7 b China: maternal mortality Scenario

China's MMR growth rate (Figure 4.7 b) was negative throughout the period from 1990 to 2014. It was -5.15 in 1990. It further decreased to 1994 by -6.49%. It improved a lithe till 1997 to -3.125. It then reduced by -4% in 2004. After then the growth trends saw a lot of ups and downs till 2010. It reached the extreme points in 2005 i.e. -6.25%, 2007 i.e. -6.97% and 2010 i.e. -5.71%. After that it again decreased till 2012 to -6.45%. It then reached -3.44% in 2013.

4.7 c China: Gross National Income (GNI) Scenario

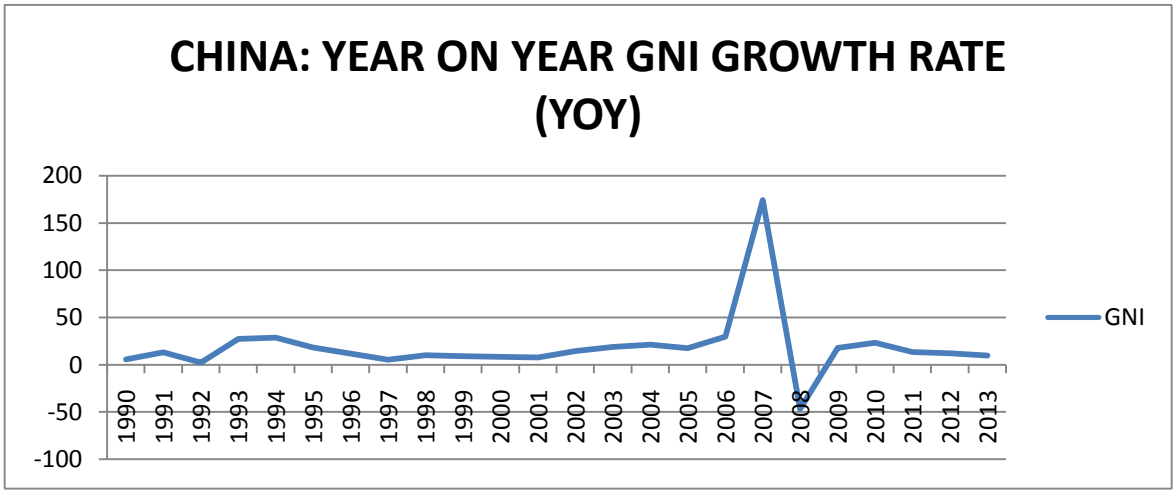

Figure 4.7 c China: Gross national Income Scenario

China's year on year growth rate for GNI (Figure 4.7 c) is almost constant. In 1990 it was 5.55%. It increased in 1991. In 1992 it again decreased to 2.32%. After that in 1993 it increased at n almost steady rate by 27.27%. In 2006 it increased and reached maximum at 174.28% in 2007. After that in 2008, it decreased to become negative at -46.875. It increased soon after that to 17.64%. In 2010, it further increased to 23.33%. After 2010 it declined but was positive only. In 2013, it was 9.57%.

4.7 d China: Improved Sanitation Facility Scenario

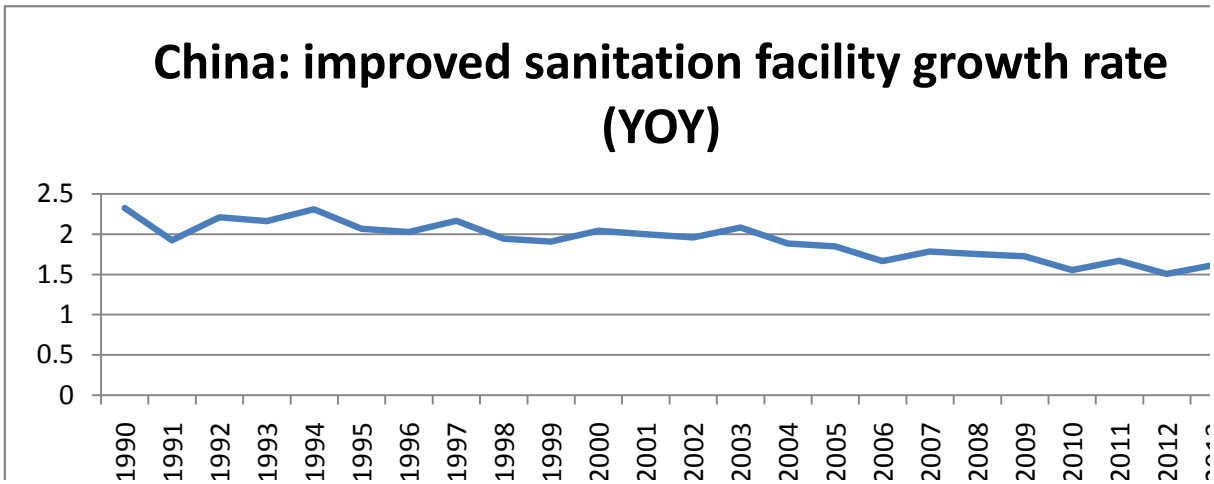

Figure 4.7 d China: improved sanitation scenario

As depicted through Figure 4.7 d, China's improved sanitation growth rate shoed a downward trend. The growth rate was 2.32 in 1990 and went down to 1.92% in 1991. The growth rate reached maximum in 1994 and was 2.30%. It reached minimum in 2014 i.e. 1.45%. It was lowest in 2006 at 1.66%.

4.7 e China: Population Scenario

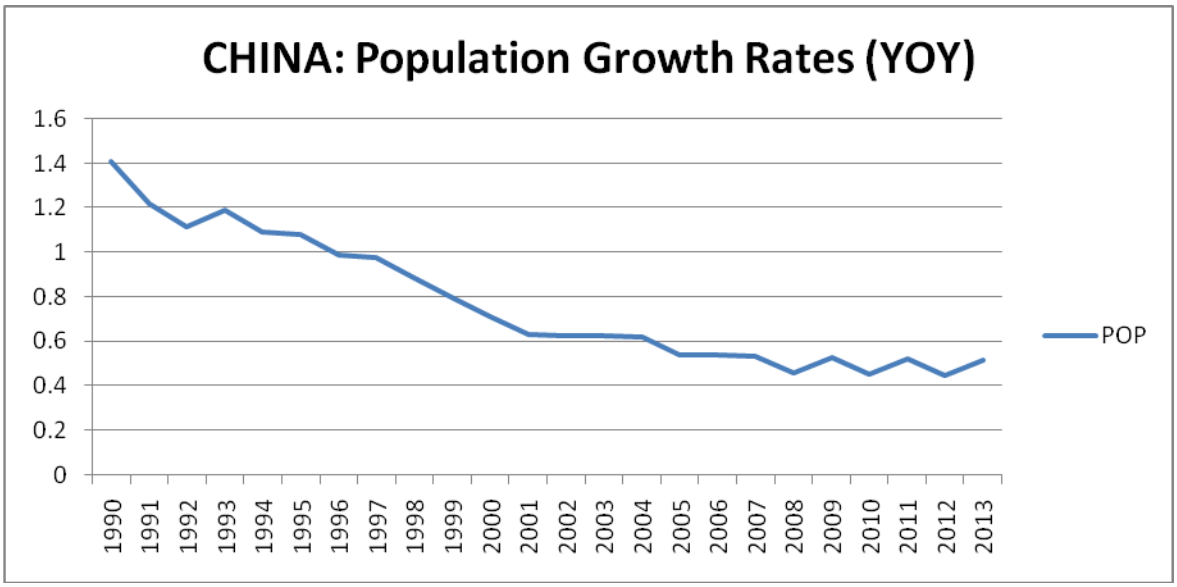

Figure 4.7 e China: Population Scenario

China's population growth rates (Figure 4.7 c) as is clear from the graph, is continuously declining. In 1990, it was 1.40%. From 1990 onwards it started falling. It increased after that, but was low. From 1997 to 2001 it fell from 0.97% to 0.62%. From 2001 to 2004 it was almost stable from 0.62% to 0.61%. After that it decreased and in 2013, it was 0.51%.

4.8 Relation of China GNI with Life Expectancy, Maternal Mortality Rate, Improved Sanitation Facility and population

Relation of China GNI with Life Expectancy, Maternal Mortality Rate, Improved Sanitation Facility and Population was done with multiple regression. GNI was dependant variable and Life Expectancy, Maternal Mortality rate, Improved sanitation facility and population were dependant variables. The results are presented in Section 4.8 a-c.

Table 4.8 a Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.875[a]	.765	.755	1.65031
2	.940[b]	.884	.874	1.18401
3	.952[c]	.906	.893	1.09224
a. Predictors: (Constant), China improved sanitation facility				
b. Predictors: (Constant), China improved sanitation facility, CP				
c. Predictors: (Constant), China improved sanitation facility, CP, China MMR				

In this model, 90.6% of variation in GNI is explained by improved sanitation facility, population and maternal mortality rate. In this model adjusted R-square is 89.3%. Thus, improved sanitation facility, population and maternal mortality rate explains 89.3% variation in GNI. If only two variables are taken i.e. sanitation facility and maternal mortality rate then adjusted R-square is 87.4% and when all the three variables are taken then adjusted R square increases to 89.3%.

Table 4.8 b ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	203.763	1	203.763	74.817	.000[b]
	Residual	62.641	23	2.724		
	Total	266.404	24			
2	Regression	235.563	2	117.782	84.018	.000[c]
	Residual	30.841	22	1.402		
	Total	266.404	24			
3	Regression	241.351	3	80.450	67.436	.000[d]

	Residual	25.053	21	1.193		
	Total	266.404	24			
a. Dependent Variable: CG						
b. Predictors: (Constant), China improved sanitation facility						
c. Predictors: (Constant), China improved sanitation facility, CP						
d. Predictors: (Constant), China improved sanitation facility, CP, China MMR						

Table 4.8 b shows F- statistic is 67.436 and is significant. Hence, the model is acceptable. Hence we will reject the null hypothesis because the calculated value is greater than the critical value.

Table 4.8 c Coefficients

Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**T**	**Sig.**
		B	Std. Error	Beta		
1	(Constant)	-17.715	2.435		-7.274	.000
	China improved sanitation facility	.340	.039	.875	8.650	.000
2	(Constant)	61.076	16.635		3.671	.001
	China improved sanitation facility	1.137	.170	2.925	6.700	.000
	CP	-.101	.021	-2.079	-4.763	.000
3	(Constant)	193.865	62.207		3.116	.005
	China improved sanitation facility	1.153	.157	2.966	7.357	.000
	CP	-.193	.046	-3.975	-4.183	.000
	China MMR	-.309	.140	-1.861	-2.203	.039
a. Dependent Variable: CG						

China (GNI) = 193.865 + 1.153 (improved sanitation facility) - .193 (population) - .309 (MMR)

(3.116) (7.357) (4.183) (2.203),

When improved sanitation is increased by 1% then China's GNI is increases by 1.15 keeping population and MMR held constant. When improved sanitation and MMR, both the components are held constant and population is decreased by 1%, then China GNI decreases

by 0.193. When MMR is decreased by 1% keeping population and improved sanitation held constant then China's GNI decreases by -0.309

4.9 SOUTH AFRICA

South Africa's life expectancy, Maternal Mortality, Sanitation facility and Gross National Income year on year growth rates are presented in Section 4.9 a- e.

4.9 a South Africa: Life Expectancy Scenario

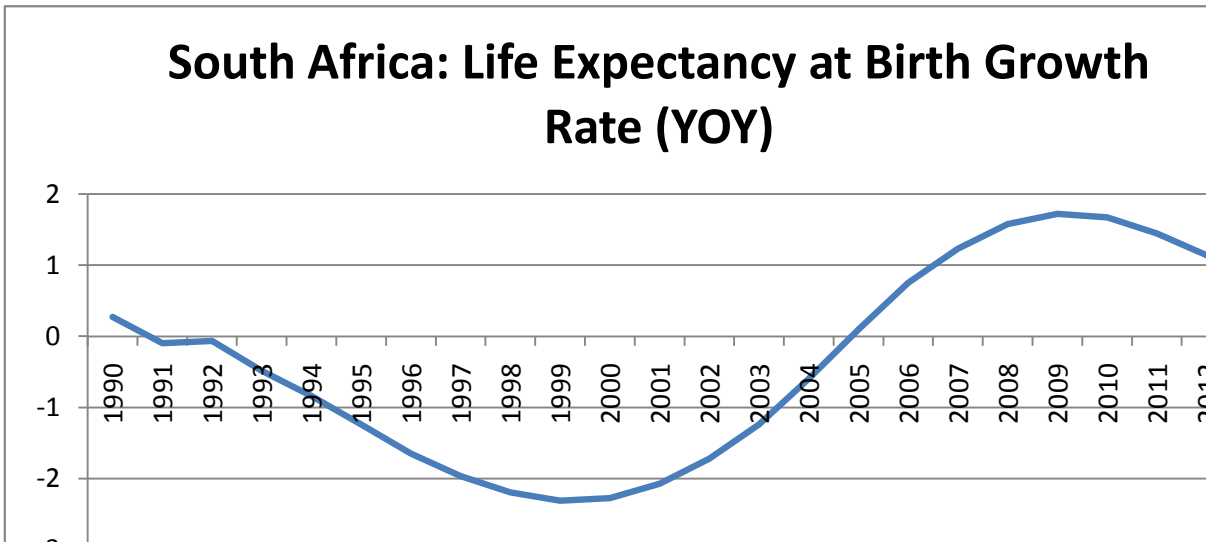

Figure 4.9 a South Africa Life Expectancy Scenario

South Africa's Life Expectancy at Birth (Figure 4.9 a) growth rate initially fell down. It was 0.27 in 1990 and immediately went to -0.096 in 1991. It further reduced and remained negative till 2004. It was minimum in 1999, which was -2.30%. It was positive in 2005 i.e. 0.096%. It remained positive till 2013 which was about 0.77%.

4.9 b South Africa: Gross National Income (GNI) Scenario

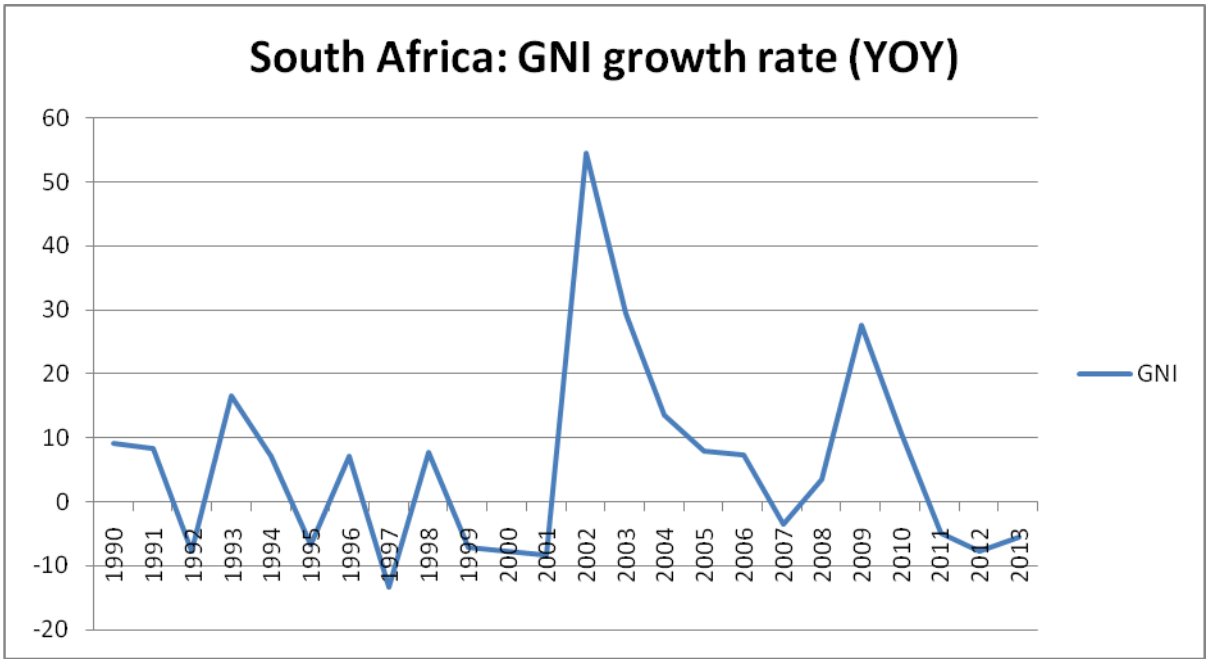

Figure 4.9 b South Africa: Gross National Income Scenario

South Africa GNI (Figure 4.9 b) growth rate increased and decreased at a very fast rate. In 1990 it was 9.09%. In 1991 it decreased and went negative in 1992 to -7.69%. It increased soon after that to 16.66% in 1993. After that it went on decreasing. It was negative in 1995 which was -6.66%. In 1996 it was again positive and was 7.14%. In 1997, it was negative -13.33%. In 1998 it was growing at a rate of 7.69%. From 1999 to 2001 it was negative. It became positive till 2010. It was - 3.44% in 2007. From 2011 to 2013 it was again falling.

4.9 c South Africa: Maternal Mortality Scenario

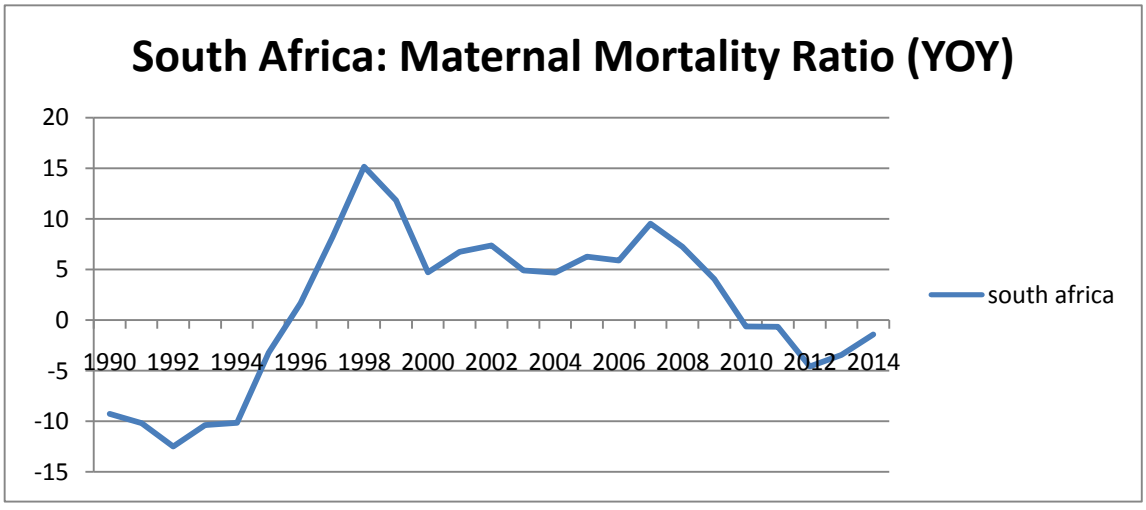

Figure 4.9 c South Africa: Maternal Mortality Scenario

In South Africa maternal mortality (Figure 4.9 c) growth rate in 1990 was -9.25%. It reduced to -12.5% in 1992. It was increasing after that, but was negative again till 1995 at -3.22%. In 1996, it became positive and remained positive till 2009. In 2010, it was -0.64%. After that it steadily went down and was -0.64% in 2010. From 2010-14, it was negative i.e. from -0.64 it decreased to -1.42.

4.9 d South Africa: population Scenario

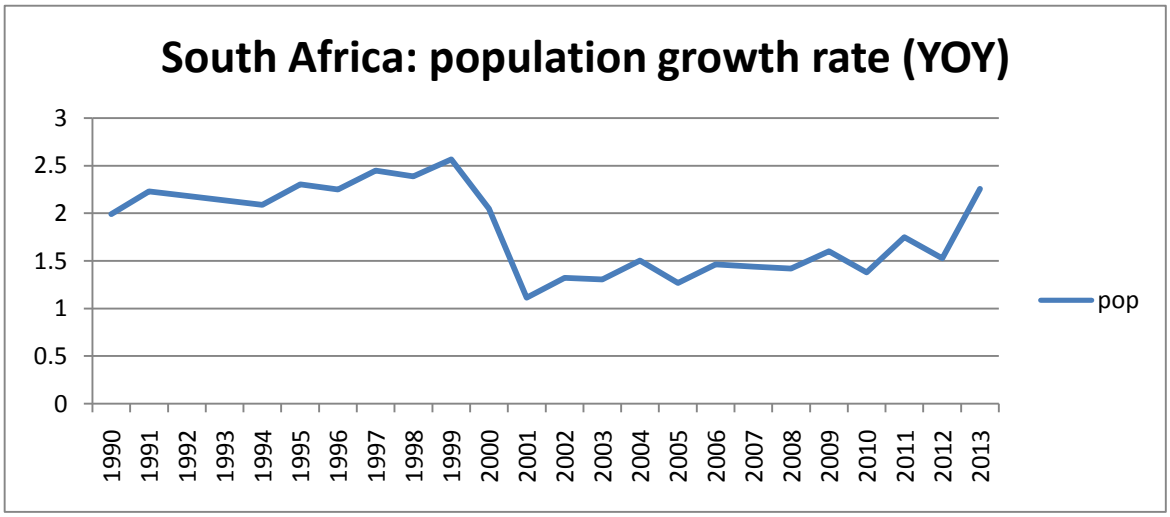

Figure 4.9 d South Africa: Population Scenario

South African population growth (Figure 4.9 d) rate was increasing in initial years. In 1990 it was 1.98%. It increased till 1999 with little ups and downs. After 1999 it went down from 2.56% till 2001 to 1.11%. After that it again increased till 2013 and reached 2.25%.

4.9 e South Africa: Improved Sanitation Facility Scenario

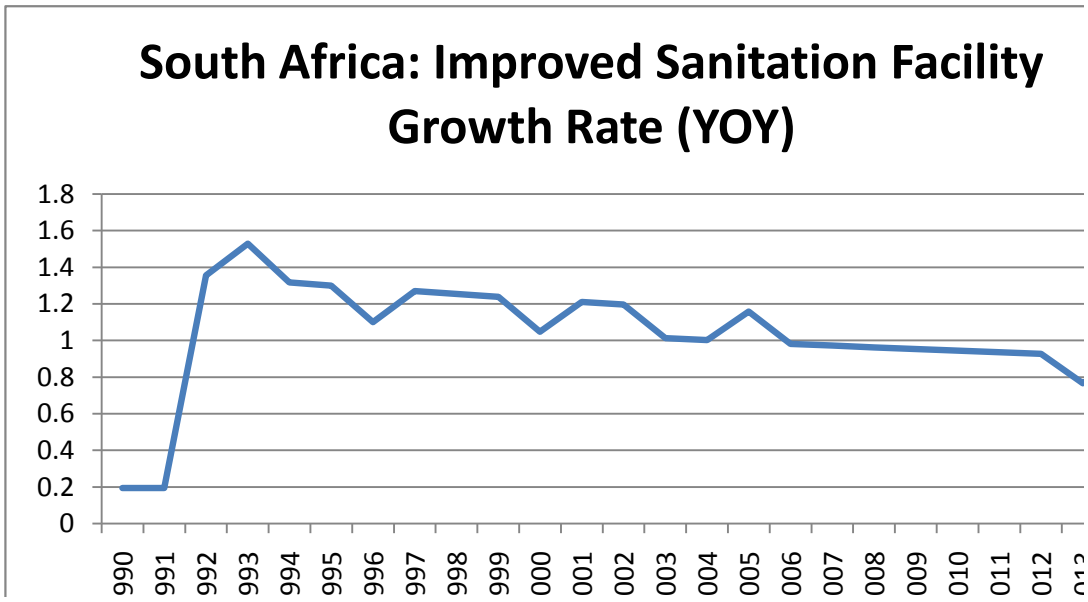

Figure 4.9 e South Africa: Improved Sanitation Facility Scenario

In 1990, improved sanitation facility (Figure 4.9 e) growth rate was 0.19%. It increased till 1993 which is about 1.52%. It then declined after 1993 till 2014. It reached decreased and in 1996 it was 1.10%, in 2000 it was 1.04% and in from 2003 was 1.01%. After that it showed a downward trend from 2006 to 2012. After 2012, it went down in 2013 to 0.76% and again increased to 0.91% in 2014.

4.10 Relation of South Africa GNI with Life Expectancy, Maternal Mortality Rate, Improved Sanitation Facility and population

Relation of South Africa GNI with Life Expectancy, Maternal Mortality Rate, Improved Sanitation Facility and Population was done through multiple regression. GNI was dependant variable and Life Expectancy, Maternal Mortality rate, Improved sanitation facility and population were dependant variables. The results are presented in Section 4.8 a-c.

Table 4.10 a Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.891[a]	.794	.785	.04702
2	.941[b]	.886	.876	.03578
3	.965[c]	.930	.920	.02863
a. Predictors: (Constant), South Africa improved sanitation facility				
b. Predictors: (Constant), South Africa improved sanitation facility, SAP				
c. Predictors: (Constant), South Africa improved sanitation facility, SAP, South Africa LEB				

In this model, 93% of variation in GNI is explained by improved sanitation facility, population and life expectancy at birth. In this model adjusted R-square is 92%. Thus, improved sanitation facility, population and life expectancy at birth explains 92% variation in GNI. If only two variables are taken i.e. sanitation facility and population then adjusted R-square is 87.6% and when all the three variables are taken then adjusted R-square increases to 92%.

Table 4.10 b ANOVA[a]

Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	.196	1	.196	88.714	.000[b]
	Residual	.051	23	.002		
	Total	.247	24			
2	Regression	.219	2	.109	85.463	.000[c]
	Residual	.028	22	.001		
	Total	.247	24			
3	Regression	.230	3	.077	93.405	.000[d]
	Residual	.017	21	.001		
	Total	.247	24			

a. Dependent Variable: SAG

b. Predictors: (Constant), South Africa improved sanitation facility

c. Predictors: (Constant), South Africa improved sanitation facility, SAP

d. Predictors: (Constant), South Africa improved sanitation facility, SAP, South Africa LEB

Table 4.10 c shows that F-statistic is about 93.405 and the value is significant, hence, the model is acceptable.

Table 4.10 c Coefficients

Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**T**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	-.912	.120		-7.610	.000
	South Africa improved sanitation facility	.019	.002	.891	9.419	.000
2	(Constant)	-3.002	.505		-5.947	.000
	South Africa improved sanitation facility	.115	.023	5.310	5.047	.000
	SAP	-.078	.018	-4.429	-4.210	.000
3	(Constant)	-3.519	.428		-8.221	.000

	South Africa improved sanitation facility	.108	.018	5.016	5.930	.000
	SAP	-.068	.015	-3.898	-4.562	.000
	South Africa LEB	.008	.002	.318	3.654	.001
a. Dependent Variable: SAG						

South Africa (GNI) = -3.519 + .108 (improved sanitation facility) - .068 (population) + .008 (life expectancy at birth)

= -8.221 5.930 4.562 3.654

As shown through Table 4.10 c, when improved sanitation is increased by 1% then the GNI of south of Africa is increases by .108, keeping both the variables population and life expectancy constant. When improved sanitation and life expectancy held constant and population is decreased by 1% then the GNI of South Africa is also decreased by 0.068. Keeping the population and improved sanitation facility held constant and life expectancy is increased by 1% then the GNI of South Africa also increases by .008.

4.11 CUMULATIVE GROWTH RATES

4.11 a Life Expectancy at Birth

S.NO.	Country name	Cumulative Growth Rate
1.	Brazil	2.46
2.	Russia	12.39
3	India	2.57
4	China	3.35
5	South Africa	4.04

The above table 4.11 a shows cumulative growth of life expectancy at birth. The growth trends are highest for Russia at 12.39% per annum and lowest for Brazil at 2.46 %per annum. The same is depicted through Figure 4.11 a.

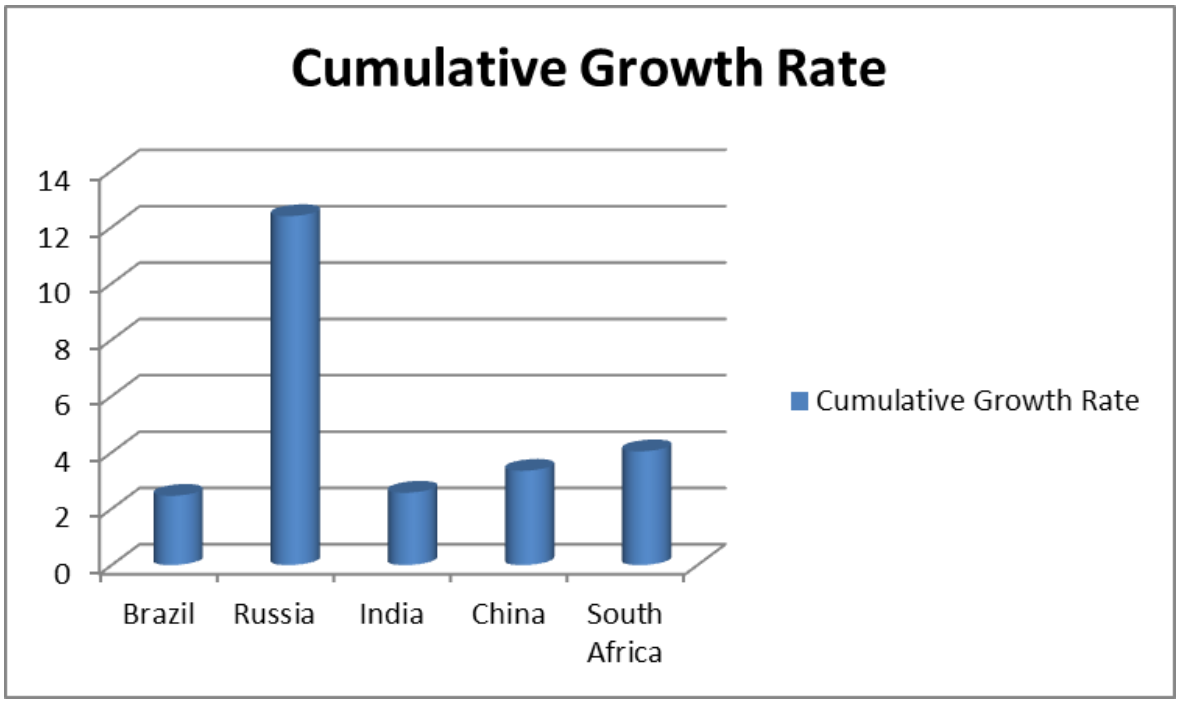

Figure 4.11 a Life Expectancy at Birth

Table 4.11 b: IMPROVED SANITATION FACILITY (% OF POPULATION WITH ACCESS)

S.NO	COUNTRY NAME	CUMULATIVE GROWTH RATE
1	Brazil	3.09
2	Russia	2.79
3	India	3.25
4	China	3.08
5	South Africa	3.31

The table 4.11 b shows cumulative growth rate for improvement in sanitation facility (% of population with access). This indicator was highest for South Africa at 3.31 %per annum. for Russia accounted for the lowest growth of 2.79 %per annum.

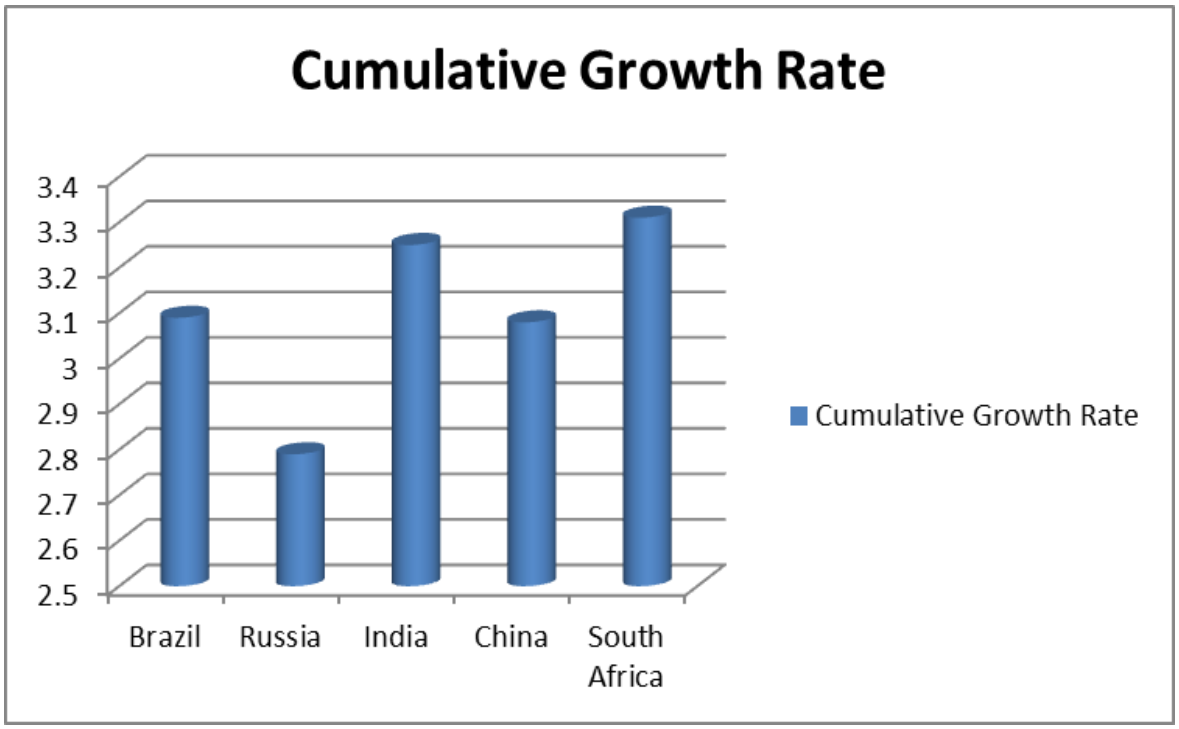

Figure 4.11 b Improved Sanitation Facility

Table 4.11 c GNI

S.NO	COUNTRY NAME	CUMULATIVE GROWTH RATE
1	Brazil	6.22
2	Russia	7.88
3	India	5.82
4	China	6.27
5	South Africa	5.45

Table 4.11 c shows cumulative growth rate of BRICS countries. In case of GNI Russia recorded maximum growth of 7.88 %per annum. The minimum growth accounting figures were for South Africa at 5.45 %per annum. Overall GNI CAGRs were more than 5 %per annum for all BRICS economies. GNI Growth has also been depicted graphically in Figure 4.11 c.

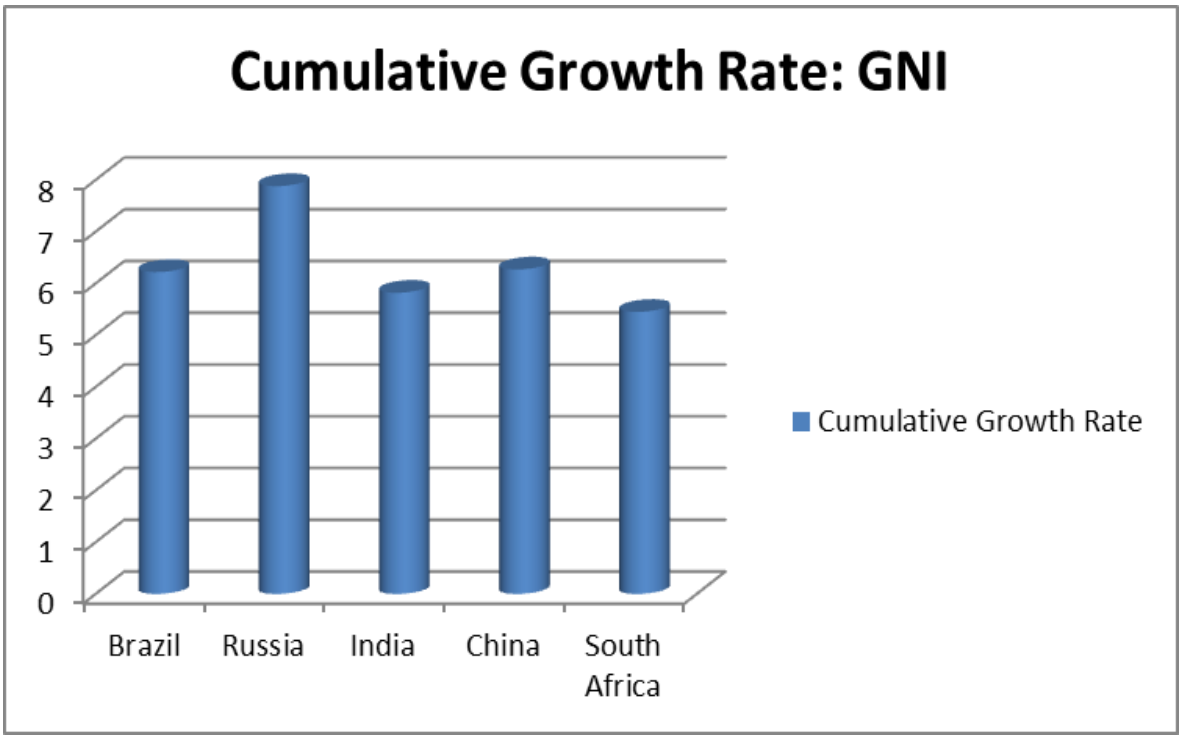

Figure 4.11 c GNI

Table 4.11 d POPULATION

S.NO	COUNTRY NAME	CUMULATIVE GROWTH RATE
1	Brazil	2.78
2	Russia	2.17
3	India	8.93
4	China	4.54
5	South Africa	2.86

Table 4.11 d and Figure 4.11 d, depicts the CAGR for Population for BRICS economies. The population growth rate was highest for India among all BRICS countries. India recorded growth rate of 8.93 %per annum, while Russia recorded the least at 2.17 %per annum.

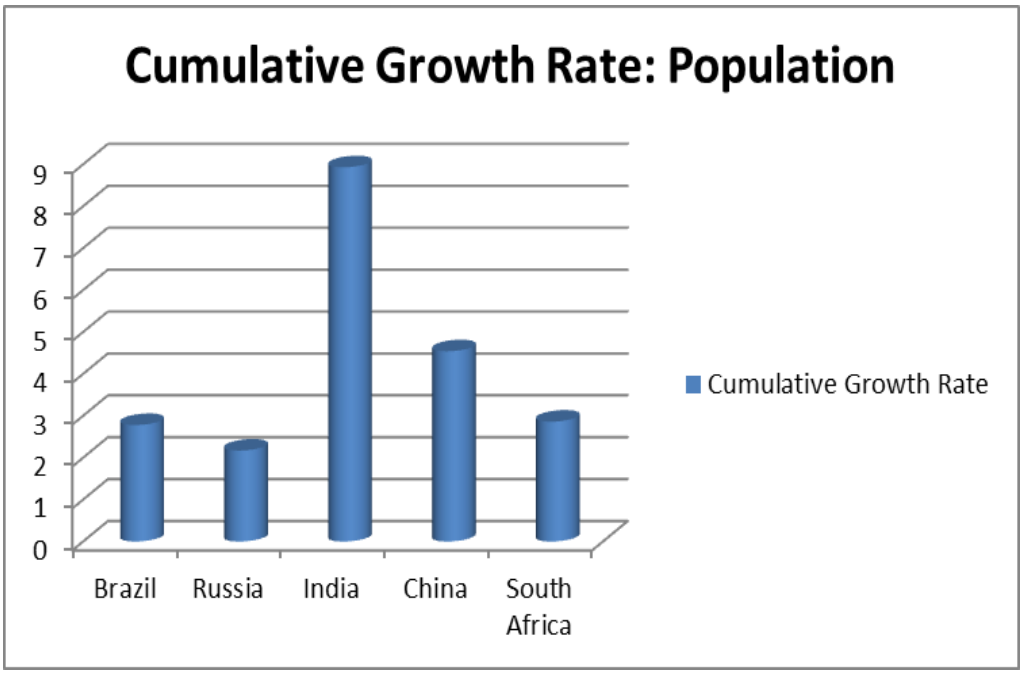

Figure 4.11 d POPULATION

Table 4.11 e MATERNAL MORTALITY RATE

S.NO	COUNTRY NAME	CUMULATIVE GROWTH RATE
1	Brazil	2.61
2	Russia	6.39
3	India	2.70
4	China	1.97
5	South Africa	10.80

Maternal mortality cumulative growth rate (Table 4.11 e) was highest for South Africa at 10.80 %per annum and lowest for China about at 1.97 %per annum. Figure 4.11 e graphically depicts the same.

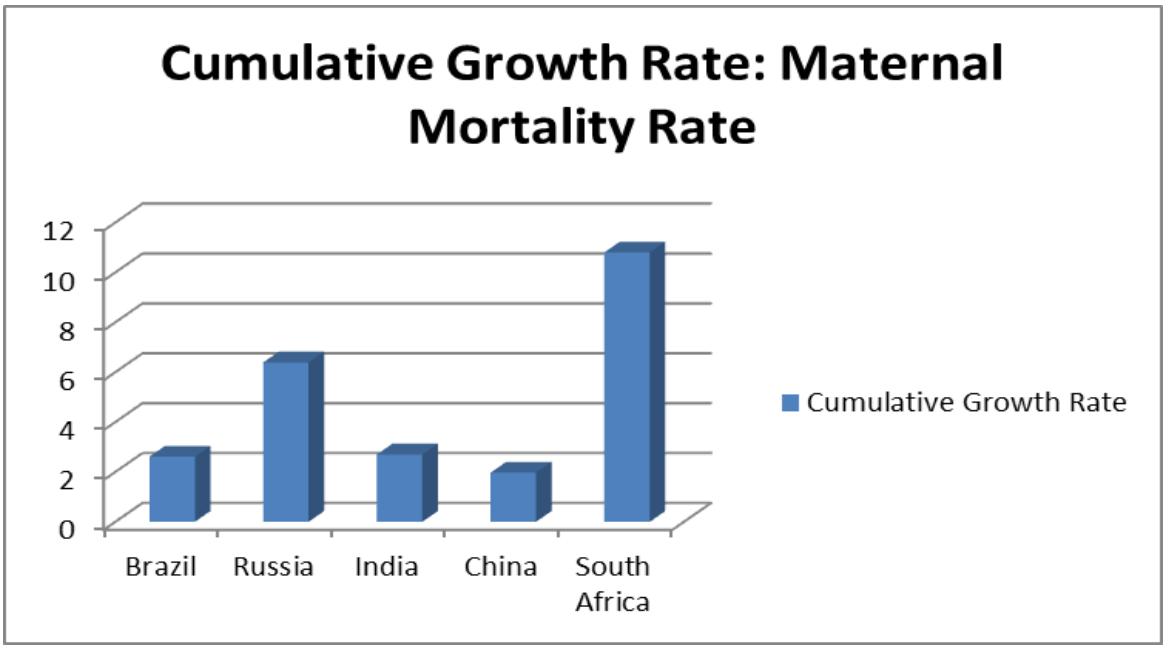

Figure 4.11 e- MATERNAL MORTALITY RATE

Summing up it can be said that in this Chapter the Year on year Growth rates have been calculated for BRICS economies. For Comparative picture CAGR for entire period have also been calculated for all parameters, viz. Life Expectancy rates, Improved Sanitation Facility, GNI, Population and Maternal Mortality Rate. Relation of BRICS nations GNI with Life Expectancy, Maternal Mortality rate, Improved Sanitation facility and Population have been analysed to find important predictors of GNI.

CHAPTER 5

CONCLUSION

5.1 SUMMARY AND FINDINGS

The aim of this research study is to analyse the GNI of BRICS nations with life expectancy at birth, infant mortality rate, maternal mortality rate and improved sanitation facility. The study also helped to understand that which components played an important role in the development of BRICS nations.

For this kind of analysis annual data has been used for year 1990- 2014 so as to see its impact on BRICS nations. The growth rates have been calculated of all the BRICS nations i.e. Brazil, Russia, India, China, and South Africa. The objectives of the study was to analyse the growth trends of BRICS nations and to identify life expectancy at birth, maternal mortality rate, GNI, population and improvement in sanitation facilities of BRICS countries.

The growth trends of life expectancy at birth are maximum in Russia, with CAGR of 12.39 per cent per annum and minimum in Brazil with 2.46 per cent per annum. The improved sanitation facility was highest for South Africa at 3.31 per cent per annum and lowest in Russia at 2.79 per cent per annum. GNI was maximum in Russia about 7.88 per cent per annum. The minimum was recorded for South Africa with CAGR of 5.45 per cent per annum. The population growth rate was highest for India among all BRICS countries and was least for Russia with CAGR of 2.17. Maternal mortality cumulative growth rate was highest in South Africa with CAGR of 10.80 per cent per annum and lowest in China at 1.97 per cent per annum.

5.2. REGRESSION RESULTS

In order to achieve different objectives of the study, multiple regression analysis were done. According to this multiple regression model, Brazil GNI growth rate is explained through three variables viz. improved sanitation facility, population and MMR and life expectancy at birth is excluded from the model.

Russia's GNI growth rate is explained through MMR, Life Expectancy at Birth and population and improved sanitation facility is excluded from the model.

India's GNI growth rate is explained through improved sanitation facility, MMR and life expectancy at birth and population is excluded from the model.

China’s GNI growth rate is explained through improved sanitation facility, population and MMR and life expectancy at birth is excluded from the model.

South Africa’s GNI growth rate is explained through improved sanitation facility, population and life expectancy at birth and MMR is excluded from the model.

After looking at different aspects of different countries it is concluded that China is at best position. It has low population growth rate, better health facility for infants and mothers from the model.

Thus, the study analysed the year on year growth rates for understanding BRICS performance for Gross National Income, Life Expectancy at Birth, Maternal Mortality rate, Population and Improved Sanitation Facility for all BRICS economies for the entire period. The impact of recession was visible on growth in all BRICS economies. A comparative study of BRICS economies was done through CAGR for Life Expectancy at Birth, Maternal Mortality rate, Population and Improved Sanitation Facility. Finally regressions helped in understanding the major predictors of Gross national Income.

5.3 Limitations of the Study

The present study covered Gross National Income, Life Expectancy at Birth, Maternal Mortality rate, Population and Improved Sanitation Facility of BRICS economies. HDI indices and Technology acceptance indices could also be analysed for in depth analysis. A future study can be undertaken focusing on these aspects.

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