CHAPTER I

INTRODUCTION AND REVIEW OF LITERATURE

1.1 INTRODUCTION

As we reached the milestone of seven billion people last year (2011), it is time to take a look at the demographics of the world. In the coming decades, despite falling birthrates, the population will continue to grow – mostly in poorer countries.

As living conditions improve, a country enters successive phases of a process called demographic transition. The death rate falls, but there is lag before the birthrate falls too. The result: Populations soars.

The industrial revolution and the resulting growth of technical innovation were associated with improvements in income, education, standards of living and levels of health indicators for the countries of the West. Thus, it has become generally accepted that there is a predictable, if not causal relationship between the strength of an economy and the indicators of health such as life expectancy of its population, and it’s infant, fertility and maternal mortality rates. It is also assumed that within populations, social class is predictive of mortality, indicating that individuals of higher social class will tend to have longer healthier life spans. In other words, in any country the health status of the population is an important pre-condition that determines economic as well as social development. Improvement of the health status of the different population groups is an
important segment of the government’s plans and programs. Indicators such as life expectancy or death rates are used to measure the health status of a population. Health programs and activities today include a variety of public efforts directed towards both fatal and non-fatal health outcome. International policy interest in such indicators is increasing (Preston, 1973; World Bank, 2007).

Development in the developing and poorer countries in the second half of the twentieth century generally has not been associated with the same positive change in the social and health status outcomes. This may be due to the rapidly increasing population levels and income inequality as well as uneven allocation of resources.

Many studies have examined the relationship between income or socio-economic status and health using cross-sectional country data (Judge, Mulligan, & Benzeval, 1998; marmot et a., 1997; Pappas et al., 1993). These studies suggest the “absolute income hypothesis” wherein population health – whether measured positively by life expectancy or negatively by mortality – improves with average income but at a decreasing rate.

In order to assess the influence of economic factors on health indicators, we used data from 44 countries representing all of the economic brackets defined by the World Bank. For our statistical analysis approach, we employed a Regression approach in which infant mortality, maternal mortality and life expectancy at birth were dependent variables and country aggregate population information in the areas of economics, literacy and pollution were the independent variables. List of 44 countries are Angola, Australia, Bangladesh, Belgium, Brazil, Central African Republic, Chad, Canada, China, Costa Rica, Denmark, Egypt, Ethiopia, Finland, France, Germany, Greece, Ireland, India, Indonesia, Italy, Japan, Kenya, Republic of Korea, Lebanon, Malaysia, Mexico, Nepal, Netherlands, New Zealand, Nigeria, Norway, Oman, Pakistan, Peru, Portugal, Saudi Arabia, Spain, Sweden, Switzerland, Thailand, United Kingdom, United States, and Venezuela. Data are pro-rated on a per capita basis. The key indicators of growth were obtained from the World Bank’s 2007 World Development Report (with data from 2005). Additional statistics on number of physicians per unit of population (physician/10,000) and healthcare expenditures were obtained from World Health Organization.

Although life expectancy is positively associated with higher Gross National Income (GNI)/Capita, there are many individual exceptions to this pattern. In addition to the linear regression approach to data analysis, we will also
focus on countries with large residuals (standard errors) from the Generalized Linear Models.

1.2 REVIEW OF LITERATURE

Life expectancy from birth is a frequently utilized and analyzed component of demographic data for the countries of the world. It represents the average life span of a newborn and is an indicator of the overall health of a country. Life expectancy can fall due to problems like famine, war, disease and poor health. Improvements in health and welfare increase life expectancy. The higher the life expectancy, the better shape a country is in.

As we can see from the map (Figure 1), more developed regions of the world generally have higher life expectancies (green) than less developed regions with lower life expectancies (red). The regional variation is quite dramatic.

However, some countries like Saudi Arabia have very high GNP per capita but don't have high life expectancies. Alternatively, there are countries like China and Cuba that have low GNP per capita have reasonably high life expectancies.

Life expectancy rose rapidly in the twentieth century due to improvements in public health, nutrition and medicine. It's likely that life expectancy of the most developed countries will slowly advance and then reach a peak in the range of the mid-80s in age. Currently, microstates Andorra, San Marino, and Singapore along with Japan have the world's highest life expectancies (83.5, 82.1, 81.6 and 81.15, respectively).

Unfortunately, AIDS has taken its toll in Africa, Asia and even Latin America by reducing life expectancy in 34 different countries (26 of them in Africa). Africa is home to the world's lowest life expectancies with Swaziland (33.2 years), Botswana (33.9 years) and Lesotho (34.5 years) rounding out the bottom.
Between 1998 and 2000, 44 different countries had a change of two years or more of their life expectancies from birth and 23 countries increased in life expectancy while 21 countries had a drop.

**Historic Life Expectancy**

During the Roman Empire, Romans had a approximate life expectancy of 22 to 25 years. In 1900, the world life expectancy was approximately 30 years and in 1985 it was about 62 years, just two years short of today's life expectancy.

**The Aging Process**

Life expectancy changes as one gets older. By the time a child reaches their first year, their chances of living longer increase. By the time of late adulthood, one's chances of survival to a very old age are quite good. For example, although the life expectancy from birth for all people in the United States is 77.7 years, those who live to age 65 will have an average of almost 18 additional years left to live, making their life expectancy almost 83 years.

**Sex (Male to Female) Differences**

Women almost always have higher life expectancies than men. Currently, the worldwide life expectancy for all people is 64.3 years but for males it's 62.7 years and for females life expectancy is 66 years, a difference of more than three years. The sex difference ranges from four to six years in North America and Europe to more than 13 years between men and women in Russia.

The reasons for the difference between male and female life expectancy are not fully understood. While some scholars argue that women are biologically superior to men and thus live longer, others argue that men are employed in more hazardous occupations (factories, military service, etc). Plus, men generally drive, smoke and drink more than women - men are even more often murdered.

**Fertility**

By the early 1970s, fertility rates across the globe have begun dropping than anyone has anticipated. The fertility decline that is now sweeping the planet started at different times in different countries. France was the first and other countries in the Western world eventually followed France.

After the World War II, the baby boom started in countries like United States. The end of a baby boom can have two big economic effects on a country. The first is the “demographic dividend” – a blissful few decades when the boomers swell the labor force and the number of young and old dependents is
relatively small, and there are lots of money for other things. Then the second effect kicks in: The boomers start to retire. The sharpening American debate about Social Security and last year’s strikes in France over retirement age are response to a problem that exists in the developed world: how to support an aging population.

Figure 1.2.1: Life Expectancy 2011 Estimates CIA (Central Intelligence Agency) World Fact-book

Female vs. male life expectancy, 2005

Source: World Development Indicators
Figure 1.2.2: Comparison of Life Expectancy by Male and Female population in the world

1.3 AIMS AND OBJECTIVES

*Facts affecting global distribution of Expectation of Life at Birth (ELOB)*

It is seen that global inequality trends are quite varied. Gross National Income (GNI) in terms of Average (per capita) Purchasing Power Parity (PPP in dollars) varies greatly. The PPP for Luxemburg is 62 times higher than Nigeria. Babies in South Saharan Africa, in poor countries of Asia and Latin America are, are at much greater nutritional risk than in rich countries. Infant Mortality Rate (IMR) and Maternal Mortality Ratio (MMR) are much higher in poorer countries than in richer countries. Differences in some of the measures are on the increase. Inequality in access to schooling is falling around the world.

Trends in life expectancy at birth have been increasing (Vaupel, 1997 and World Development Reports, 2006-2008). This happened till 1990 while different picture emerges for income and consumption. After 1990, however, because of HIV/AIDS, life expectancy at birth has fallen dramatically in some of the world’s poorest countries.

It would be of interest to examine the effect of some of the factors on the life expectancy of the countries of the world. These factors are GNI (per capita PPP), density of population, average years of schooling and carbon dioxide emission (per capita metric ton) and so on.

It is intended to examine the impact of these factors as well as some are factors on Expectation of Life on Birth (ELOB).

Life expectancy has improved over the years. About more than a century ago, life expectancy was 47 years, which improved to 65 years in the mid-twentieth century. Bismarck (1890) of Germany set the retirement age of German auto-workers to 65 based on life expectancy in Germany at that time, which became the universal age of retirement throughout the world. Now that the demographics of aging are changing, it is too early to retire and live a healthy living well into the eighties. By 2020, the population above 65 will double in number (see Figure 1.3.1).
Presently, China has the most number of older people due to the one-child policy. In India, the population is well distributed through the different age groups. So India is a favorite place for marketers as well as researchers for demographics based marketing and research.

1.4 ORGANIZATION OF THE CHAPTERS

The present work entitled “A Study In World And Indian Demographics: Using Statistical Computing Methodology” consists of nine chapters and appendix.

Chapter–I includes the history of Expectancy of Life at Birth (ELOB) and the quantification of the human ageing process.

Chapter – II describes the Demographic Measures used in this present study. It describes computational statistical methodology as well as specific demographic measures, HDI, HPI – 1 & 2, Sex-ratio, discrimination against females.

Chapter–III deals with the relationships and variable identification for predictive modeling. My approach discusses the traditional linear models, generalized linear models, link functions etc. It also describes the statistical computing package – SAS (Statistical Analysis System) and exploratory data analyses.

Chapter–IV discusses use of SAS programming in Demographic Data Analysis and Algorithm development. These methods describe how to fit functional form, curve fitting and interpretation.

Chapter – V deals with methodology and algorithms for computation of demographic and statistical methods with actual demographic data (Worldwide).

Chapter – VI discusses Life Expectancy at Birth – the World Scenario versus India and key countries (OECD) and Sub Saharan Africa. It includes multiple relation models for ELOB. It describes and uses the new methodology (2010 UNDP) for computing HDI.

Chapter – VII deals with NFHS-3 Survey (2005-06) Statistics of India, Assam and some of the major States of India (Haryana, Maharashtra, Andhra Pradesh, Orissa, Kerala, Uttar Pradesh and West Bengal). A comparison of Total Fertility Rate (TFR) is also included. An expression for estimation of TFR is also given.
Chapter – VIII deals with some aspects of the latest Indian Census of 2011. It describes growth of population, literacy rate, health factor, sex-ratio as well as poverty challenge. It deals with Sample Registration System (SRS) data (July, 2011), Millenim Development Goals (MDG).

Chapter – IX gives a summary as well as conclusions; it includes future scope of research and limitations.

There are References and Glossary

Appendix includes Demographic Termilogy etc.

It also includes:

2. SPSS (Statistical Package for Social Science) Flow Charts.
Figure 1.3.1: Pictorial views of life expectancy at birth are given in this diagram. The world map of ELOB for 2009 is compared to 1996 data (Weiss, National Geographic).