Research Paper Economics

Life Expectancy, Immunization and Health Expenditure: An Analysis For India (1995-2011)

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ABSTRACT

- This paper intends to analyze the trends in life expectancy at birth in India during 1995-2011 and tries to study how factors such as health expenditure per capita, out-of-pocket health expenditure, immunization and improved sanitation facilities have impacted the life expectancy at birth for the total population. The ordinary least square methodology is used to carry out the analysis of impact of these factors on life expectancy at birth. This paper also suggests possible measures, on the basis of the findings of analysis undertaken, that can be adopted by policy makers in order to increase average life expectancy in India and thus contributing towards the development of the country.

KEYWORDS life expectancy at birth, health expenditure per capita, out-of-pocket health expenditure, immunization and improved sanitation facilities.

1. INTRODUCTION

India since the time of independence has experienced low life expectancy at birth, high infant and adult mortality rates, high undernourishment prevalence and lack of accessibility to proper sanitation etc. This paper analyzes the changes in trends of these factors that have been experienced during the period of 1995-2011 in India. Section 3 briefs about the available literature in this area. In section 4, this paper studies the trends in life expectancy at birth for males, females and for entire population as a whole in India during 1995-2011. Section 5 shows the results of the regression analysis carried out to see how factors such as health expenditure per capita (current US$), out-of-pocket health expenditure (private expenditure) (% of total expenditure on health), immunization, DPT (Diphtheria, Pertussis and Tetanus vaccination) (% of children ages 12-23 months) and improved sanitation facilities (% of population with access) have impacted life expectancy at birth for total population in India during 1995-2011. Section 6 states major findings of this paper and gives concluding remarks on the results obtained for India during 1995-2011.

2. RESEARCH OBJECTIVE

This paper attempts to analyze the trends in life expectancy at birth for males, females and for entire population as a whole. The impact of factors such as health expenditure per capita, out-of-pocket health expenditure, immunization and improved sanitation facilities on life expectancy at birth (for total population) is analyzed through estimation of a simple linear regression model using an ordinary least square methodology. Finally, on the basis of findings of the regression analysis, this paper tries to suggest some effective policy initiatives and efficient channels that can ensure improvement of life expectancy in India.

3. LITERATURE REVIEW

Life expectancy at birth for any country depends on several economic factors such as availability of proper medical services in place, effective food distribution programmes so as to ensure people's access to certain minimum standard of nutrition levels etc. Many researchers, across the world, have shown their interest in this area and have come up with interesting results.

A study by Robin S. Lau, Shanthi Johnson and T. J. Kamalanabhan, examined the life expectancy and healthy life expectancy in India in a dynamic perspective and using future projections. And they have found that benefits accruing from a decrease in mortality but not in all age and gender groups, increasing disability, increase in life expectancy and healthy life expectancy and largest gains in future in terms of increased life expectancy are accruing to old age people in Indian context. This study clearly demonstrates that effect of development that increases life expectancy mainly affects the older age group population in India.

Poonam Kuruganti has analyzed post-independence India has found public health has been able achieve a decrease in death rates. This study shows that public health facilities do improve mortality and thus life expectancy. She also analyzed the status of infant mortality rates and that these have also been declining since 1951.

A study by World Health Organization has also stated that vaccination across different countries reduces diseases, disability, death and inequity.

Therefore, one can infer that proper immunization, access to safe source of water, adequate nutrition, and justified expenditure by government on public health care and services are some of the important ways and means that empirical studies suggest for improving the average life expectancy for any country.

4. TRENDS IN LIFE EXPECTANCY IN INDIA DURING 1995-2011

This section studies the trends in life expectancy at birth during 1995-2011. In general one would expect that with development literacy rates to rise, mortality rates to fall, nutritional status to improve, standard of living that people enjoy to rise etc. Every economy over its time path is growing as well as developing. Therefore, one would expect that effects of development would get reflected in various indicators of economy not only in economic indicators but also in non-economic and social indicators. Since every economy over a period of time develops despite the fact that different economies adopt their own strategies and development takes place at different rates in each economy, one would expect the indicators of development to improve over time. In other words, one would expect the life expectancy at birth to increase as a country develops.

Figure 1 shows the trend in life expectancy at birth (for total population) in India during 1995-2011. It shows a clear upward trend i.e. life expectancy at birth (for total population) increased from 60.18 years in 1995 to 65.95 years in 2011. Also, the rate of increase in life expectancy at birth (for total population) is reasonably good and if India keeps on moving on the same trajectory then it will achieve levels of life expectancy at birth that will be at par with the levels prevailing in developed world.

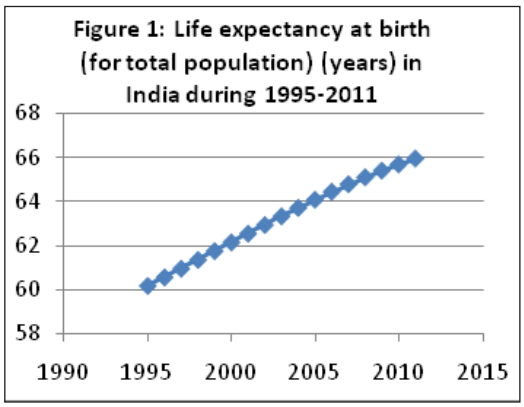


Figure 2 shows the trend in life expectancy at birth (for males) in India during 1995-2011. It shows a clear upward trend i.e. life expectancy at birth (for males) increased from 59.35 years in 1995 to 64.25 years in 2011. Also, the rate of increase in life expectancy at birth (for total males) is similar to the rate of increase in life expectancy at birth (for total population).

$(LE)_t = \alpha_0 + \alpha_1 (HEPC)_t + \varepsilon_t$

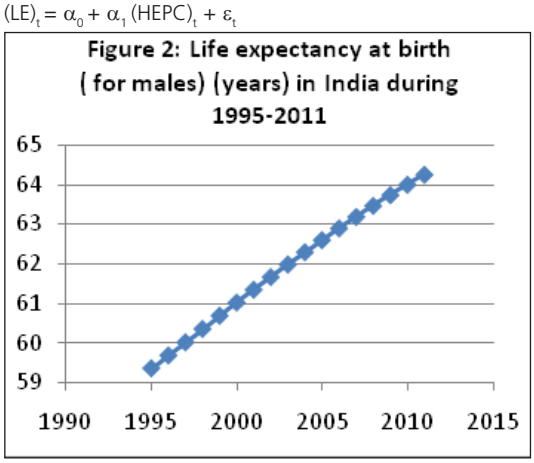
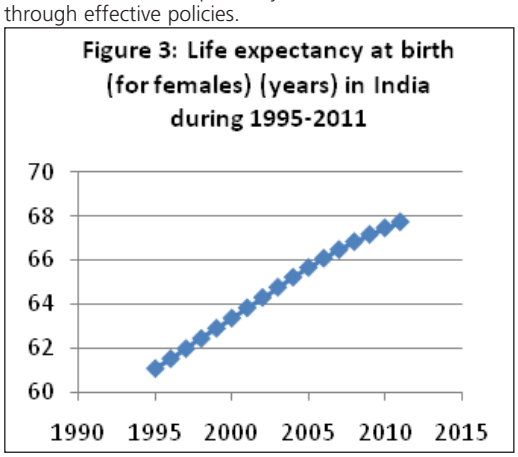


Figure 3 shows the trend in life expectancy at birth (for females) in India during 1995-2011. It shows a clear upward trend i.e. life expectancy at birth (for females) increased from 61.06 years in 1995 to 67.74 years in 2011. The life expectancy at birth for females is greater than that for males because of biological reasons that is, biologically females have a longer life relative to that of males. Also, the rate of increase in life expectancy at birth (for total males) is similar to the rate of increase in life expectancy at birth (for total population) but after 2005-06 there is a slight decline in the rate of increase in life expectancy at birth (for females). But this is just a slight decline and can be easily overcome through high rates of increase in life expectancy at birth (for females) in future through effective policies.



5. FACTORS THAT IMPACTED LIFE EXPECTANCY IN INDIA DURING 1995-2011

This section analyzes the impact of different factors such as health expenditure per capita (current US$), out-of-pocket health expenditure (% of total expenditure on health), immunization, DPT (% of children ages 12-23 months) and improved sanitation facilities (% of population with access) on life expectancy at birth (for total population) in India during 1995-2011.

Impact of health expenditure per capita (current US$) on life expectancy at birth (for total population)

To analyze the impact of health expenditure per capita (current US$) on life expectancy at birth (for total population) in India, a simple linear regression model is constructed and estimated using ordinary least square methodology. Following regression model is constructed:

Where, t stands for time period (in years), α_0 is intercept term, α_1 is the slope coefficient denoting the average effect of a unit point increase in HEPC on LE, LE is life expectancy at birth (for total population), HEPC is of health expenditure per capita, ε_t is the error term.

Table 1 shows results of estimation of above regression for India for the period 1995-2011.

TABLE 1

Life-expectancy at birth (for total population)	Coefficient	Standard error	t-value
HEPC (α_1)	.1287216	.0134471	9.57
Constant (α_0)	59.4464	.4334409	137.15

Table 1 shows that health expenditure per capita contributes significantly in improving the life expectancy at birth in India during 1995-2011 and a unit point increase in HEPC has increased LE by 0.1287216 points on an average. Also R-square i.e. coefficient of determination is 0.8593 which is quite high indicating good explanatory power of this model. HEPC is an excellent measure to study the effect of expenditure in health (or life expectancy). It shows the amount of expenditure that is being incurred on an individual on an average basis. The higher the HEPC value the higher is the gain that accrues to an individual and thus the more the healthy he would be. This would eventually translate into a higher life expectancy at birth for every individual and thus for the economy as a whole. And for India during 1995-2011, this analysis also shows that increase in HEPC has led to an increase in life expectancy at birth for the total population.

Impact of out-of-pocket health expenditure (% of total expenditure on health) on life expectancy at birth (for total population)

To analyze the impact of out-of-pocket health expenditure (% of total expenditure on health) on life expectancy at birth (for total population) in India, a simple linear regression model is constructed and estimated using ordinary least square methodology. Following regression model is constructed:

$(LE)_t = \beta_0 + \beta_1 (OPHE)_t + \varepsilon_t$

Where, t stands for time period (in years), β_0 is intercept term, β_1 is the slope coefficient denoting the average effect of a unit point increase in OPHE on LE, LE is life expectancy at birth (for total population), OPHE is out-of-pocket health expenditure, ε_t is the error term.

Table 2 shows results of estimation of above regression for India for the period 1995-2011.

TABLE 2

Life-expectancy at birth (for total population)	Coefficient	Standard error	t-value
OPHE (β_1)	-.2858046	.117392	-2.43
Constant (β_0)	82.43916	7.894784	10.44

Table 2 shows that out-of-pocket health expenditure adversely affected the life expectancy at birth in India during 1995-2011 and a unit point increase in OPHE decreased LE by 0.2858046 points on an average. But R-square i.e. coefficient of determination is 0.2832 which is quite low indicating poor explanatory power of OPHE in explaining the changes in life expectancy at birth during 1995-2011. This inverse relation exhibited by OPHE with LE can be explained by arguing that even though the government is spending on health but the amount is just not sufficient and huge private expenditure needs to be incurred in order to ensure a good health. And this insufficient government expenditure on health translates into a poor quality of life especially for the poor and vulnerable classes who mainly depend upon government services and cannot afford private health care for ensuring their good health. Thus, on an aggregate level, this would lead to deterioration of health and thus a decline in life expectancy. But in India, we have seen in figure 1, that LE has been increasing during the entire period of 1995-2011, therefore there are some other factors that dominate this negative effect of OPHE in India.

Impact of immunization, DPT (% of children ages 12-23 months) on life expectancy at birth (for total population)

To analyze the impact of immunization, DPT (% of children ages 12-23 months) on life expectancy at birth (for total population) in India, a simple linear regression model is constructed and estimated using ordinary least square methodology. Following regression model is constructed:

$$(LE)_t = \delta_0 + \delta_1 (IMM)_t + \varepsilon_t$$

Where, t stands for time period (in years), δ_0 is intercept term, δ_1 is the slope coefficient denoting the average effect of a unit point increase in IMM on LE, LE is life expectancy at birth (for total population), IMM is immunization, DPT (% of children ages 12-23 months), ε_t is the error term.

Table 3 shows results of estimation of above regression for India for the period 1995-2011.
TABLE 3

Life-expectancy at birth (for total population)	Coefficient	Standard error	t-value
IMM (δ_1)	.1925642	.0803659	2.40
Constant (δ_0)	50.63515	5.276534	9.60

Table 3 shows that immunization, DPT (% of children ages 12-23 months) has led to an improvement in the life expectancy at birth in India during 1995-2011 and a unit point increase in IMM has increased LE by 0.1925642 points on an average. Though R-square for this analysis is quite low i.e. 0.2768 only yet the contribution is positive which is important. This shows that immunization has also contributed to the increasing trend in life expectancy at birth witnessed in India during 1995-2011.

Impact of improved sanitation facilities (% of population with access) on life expectancy at birth (for total population)

To analyze the impact of improved sanitation facilities (% of population with access) on life expectancy at birth (for total population) in India, a simple linear regression model is constructed and estimated using ordinary least square methodology. Following regression model is constructed:

$$(LE)_t = \phi_0 + \phi_1 (ISF)_t + \varepsilon_t$$

Where, t stands for time period (in years), ϕ_0 is intercept term, ϕ_1 is the slope coefficient denoting the average effect of a unit point increase in ISF on LE, LE is life expectancy at birth (for total population), ISF is improved sanitation facilities (% of population with access), ε_t is the error term.

Table 4 shows results of estimation of above regression for India for the period 1995-2011.
TABLE 4

Life-expectancy at birth (for total population)	Coefficient	Standard error	t-value
ISF (ϕ_1)	.4231311	.0063027	67.13
Constant (ϕ_0)	51.3425	.1792798	286.38

Table 4 shows that improved sanitation facilities (% of population with access) has led to an increase in the life expectancy at birth in India during 1995-2011 and a unit point increase in ISF has increased LE by 0.4231311 points on an average. Also R-square for this analysis is extremely high i.e. 0.9967. This indicates towards the fact that most of the deaths, that decreases the life expectancy on an average as a whole, are due to communicable diseases which are caused by poor sanitation. Thus, in a country like India, where more than 70% of population is still living in rural areas sanitation problem is a major concern. Also this analysis shows that a unit point increase in ISF has increased LE by 0.4231311 points on an average and this is highest of all the effects that are analyzed in this paper. Therefore, improving sanitation facilities especially in rural areas will lead to a significant and sharp increase in life expectancy at birth in India.

6. CONCLUSION

This paper finds that life expectancy at birth (for total population) has been consistently increasing for India during 1995-2011. The life expectancy at birth for males and females separately is also increasing throughout the period though the rate of increase of life expectancy at birth for females during 2005-11 as shown in figure 3 but this slight decrease can be easily overcome by introducing suitable policies in future that intend to increase life expectancy for males and females both in same proportion. Also, some social factors, that deprive females especially in rural areas from good quality and nutritious food, must be taken care of through the effective programmes such as media and street plays creating awareness about the proper diet and nutrition for females as also to introduce policies and programmes which alter and transform the social attitudes, beliefs and values intensely held by people that deprives education to girl child and females, this measure will lead to controlling/combating the discrimination and distinctions encountered by females thereby establishing more gender equality also.

Health expenditure per capita contributes significantly in improving the life expectancy at birth in India during 1995-2011 and a unit point increase in HEPC has increased LE by 0.1287216 points on an average. This indicates that government health expenditure is necessary and must be increased so as to witness sharp increases in life expectancy at birth in India.

Out-of-pocket health expenditure (private expenditure) adversely affected the life expectancy at birth in India during 1995-2011 and a unit point increase in OPHE decreased LE by 0.2858046 points on an average. As discussed in section 5, this acts as an alarm for the government so that it starts increasing effective spending on health care services by making available health services to all by establishment of government run hospitals and primary health care facilities uniformly scattered over all regions especially in rural areas and for the poor, disadvantaged and vulnerable people.

Immunization, DPT (% of children ages 12-23 months) has led to an increase in the life expectancy at birth in India during 1995-2011 and a unit point increase in IMM has increased LE by 0.1925642 points on an average. Therefore, on the basis of this finding, one can suggest that government must improve the process of immunization of children in ages 12-23 months. Immunization in children is also critical for controlling and reducing infant mortality rates in India. Therefore,

through increased emphasis and improved immunization programmes the government can deal not only with the issue of life expectancy at birth but can also combat the problem of high infant mortality rates in India therefore the government must ensure efficient and effective strategies for the immunization programmes & inoculation which will protect the people from various deadly and life threatening diseases as also to improve the health status of the population.

Improved sanitation facilities (% o-f population with access) has also led to an increase in the life expectancy at birth in India during 1995-2011 and a unit point increase in ISF has increased LE by 0.4231311 points on an average. Improving sanitation facilities will not only significantly contribute towards the increase in life expectancy at birth but will also overcome the problem of high incidence of communicable diseases i.e. Burden of Disease will also get lowered in India as high degree of insanitary and unhygienic conditions greatly contributes to the breeding ground of diseases which calls for higher public health care expenditure it is well said prevention is better than cure. Therefore, increasing public expenditure on sanitation facilities is strongly recommended as the most worthwhile investment for the government as it resolves multiple issues simultaneously, that is, it leads to lowering the diseases especially communicable ones resultantly reducing the health care expenditure on total basis and increasing the health standards of the population which culminates into the healthy India.

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