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Effect of Change of Major Health Determinants on Health Status through Change of Health Indicators in the Society

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Abstract

There are several indicators and determinants of health status in the systems that affected the behavior of the population regarding their good health as well as the development. In this article we make use of three health indicators namely crude birth rate, crude death rate and infant mortality rate and four determinants namely per capita income, number of government hospitals, government expenditure on health as a percentage of total government expenditure. We demonstrate the major trends in the determinants and the indicators of health status in India during the time period of three consecutive censuses from year, 1981-2001. Further using multiple regressions and model fitting we also estimate the effect of determinants of health on the indicators of health status in the society which are the main responsible aspect of development of a nation.

Key Words: Health determinants, Health indicators, Multiple regression, Model fitting

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1. Introduction

Economic development is typically measured in terms of jobs and income, but it also includes improvement in human development, education, health choice and environmental sustainability recognizing the importance of quality of life. Quality of life is also sometimes defined not only to include better education and improved health but also nutrition conservation of natural resources, a cleaner environment and a riches cultural life. Whatever the specific components of this better life, development in all societies must have at least the following three objectives:

(1) To increase the availability and widen the distribution of basic life sustaining goods such as food, shelter, health and protection.

(2) To raise levels of living, including in addition to higher incomes, the provision of more jobs, better education and greater attention to cultural and human values, all of which will serve not only to enhance material well being but also to generate greater individual and national self esteem.

(3) To expand the range of economic and social choices available to individuals and nationals by freeing them from servitude and dependence not only in relation to other people and nation states but also to the forces of ignorance and human misery.

Education and health are basic objectives of development; they are important ends in themselves. Health is central to well being and education is essential for a satisfying and rewarding life, both are fundamental to the broader nation of expanded human capabilities. That lies at the heart of the meaning of development. At the same time, education plays a key role in the ability of a developing country to absorb modern

technology and to develop the capacity for self-sustaining growth and development. Moreover, health is a prerequisite for increase in productivity, while successful education relies on adequate health as well. Thus both health and education can also be seen as vital components of growth and development as inputs to the aggregate production function. Their dual role as both input and output gives health and education their central importance in economic development. The developing world continues to face great challenges as it seeks to continue to improve the health and education of its people. The distribution of health and education with in countries is as important as income distribution; life expectancy may be quite high for better off people in developing countries but lower for the poor.

We then consider the relationships between income on the one hand and health on the other. Despite their close relationship, we will see that the record shows that higher household income is no guarantee of improved health and education: Human capital must be given direct attention in its own right, even in economics that are growing rapidly. Health may be highly unequally distributed, just as income and wealth are. But improved health and education help families escape some of the vicious cycles of poverty in which they are trapped. At the same time, the most important root cause of poor health in developing countries is poverty itself. We have taken a systematic look at and health system in developing countries, to understand the sources of the serve inequalities and inefficiencies that continue to plague them. We find compelling evidence that investments in human capital have to be undertaken with both equity and efficiency for them to successfully realize their potential impact on incomes. The effects of change of

the determinants on the health status of the country explain the improvement of these issues to control the imbalance between economy and development.

2. Major Determinants and indicators of Health Status

Health is an important constituent of well being and foundation for prosperity and development of a country. It is a state of complete physical, mental and social well being of the individuals in a society. Now-a-days, health has been recognized as a right of every citizen in many countries. India is signatory of Alma Ata Declaration of 1978 which placed the goal of "Health for All by 2000 AD" i.e. an acceptable level of health for everybody. Recently, India has been making impressive strides in this direction. The life expectancy at birth increased from 60 years during 1991 to 65.3 years during 2001. The birth rate per thousand was 29.5 in 1991 and came down to 25.4 in 2001(figures are in per 1000 population). Death rate per thousand decreased from 9.8 in 1991 to 8.4 in 2003. Similarly infant mortality rate per thousand also declined from 80 to 66 during the same time period in per 1000 live births. Therefore it seems to be an important and relevant area of the study to analyze the health status in India. As mentioned earlier the major objectives of this article are to analyze the major trends in the determinants and the indicators of health status, to estimate the effects of determinants of health on the indicators of health status.

Therefore, for this purpose it is necessary to decide upon the major determinants and indicators of health status. In this study too, these three indicators of health status have been used. These are Birth Rate, Death Rate and Infant Mortality Rate. A fall in all of these indicators shows an improvement in health status. It is recognized that health status is related to and determined by numerous factors-per Capita income, way of life,

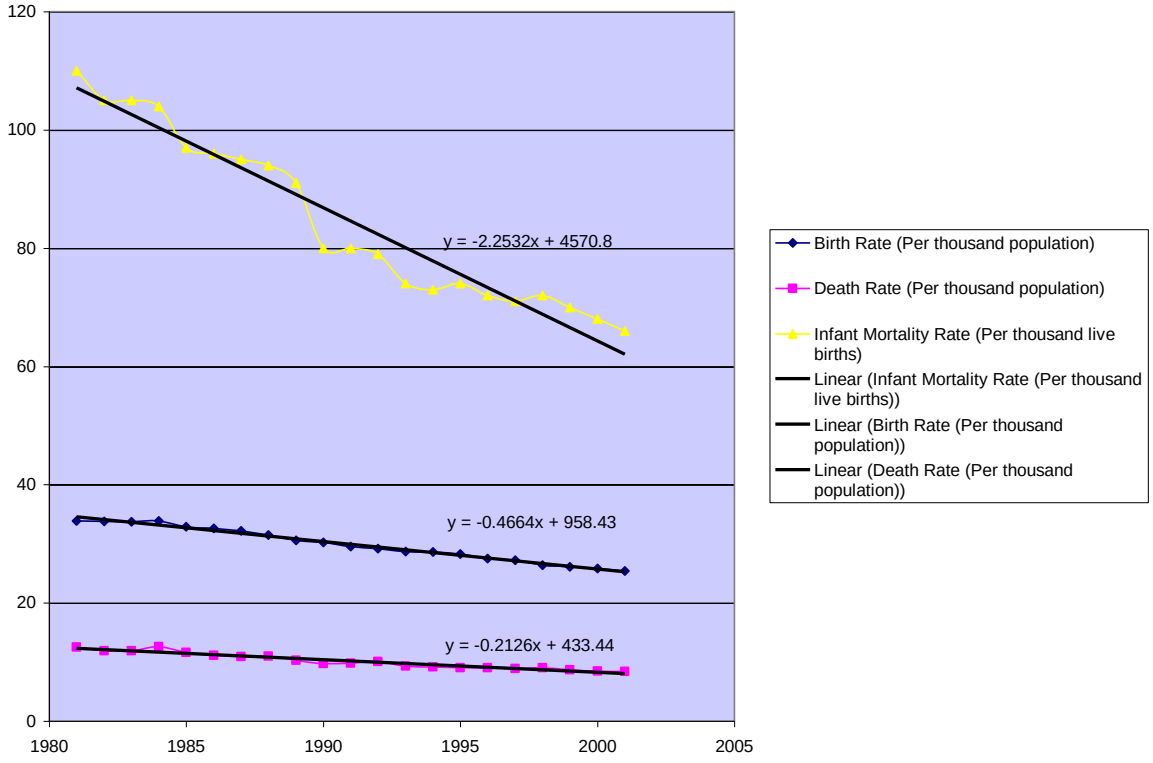
marital status, housing, sanitation, water supply, infrastructure, social organization, structure of the economy, nutrition, education, health services provided by the government, political and administrative set-up, geography, climate, religious beliefs etc.

In this article the per capita income current prices (in `), the number of government hospitals per 1 million population, government expenditure on health as percentage of total government expenditure, number of hospital beds per 1 million population have been used as determinants of health status of the people in India. Rise in per capita income and the improvement in health indicators appear to be highly correlated; one would expect the rise in per capita income to be associated also with a rise in expenditure on health.

Government expenditure on health is the most important component of investment in human capital in the sense that when people are healthy, their mental horizons will be widened and they will be active and enthusiastic. Expansion and utilization of health facilities is another important determinant of health status. Human beings are prone to become victims to various types of disease like viral, bacterial, communicable, and chronic and so on. Hence adequate health facilities i.e. both medical and public health including water supply are very essential to promote the health status of the people. Adequate availability and effective use of health facilities will reduce mortality, morbidity and debility and thereby promote the welfare of the people. Number of government hospitals per 1 million population and number of beds per 1 million populations are the two determinants that have been used in this study in order to incorporate available health facilities in India.

Figure 2.1

Trends of Health Indicators



Source: Health Information of India 2002

3. The Effect of Change of Determinants of the Health on the Indicators of the Health Status

As mentioned earlier there are several indicators of health status but only three indicators (Dependent Variables) and four determinants (Independent Variables) have been taken under consideration. These are as follows:

Table No. 3.1

Description about Factors

Dependent Variables (Indicators of Health Status)		Independent Variables (Determinants of Health Status)	
1	Birth rate (Y_1)	1	Per capita income (X_1)
2	Death rate (Y_2)	2	Number of government hospitals (X_2)
3	Infant mortality rate (Y_3)	3	Government expenditure on health as of percentage of total government expenditures (X_3)

In order to estimate the effect of determinants of health status on each of the indicators of health status, a multiple regression of the following form is used.

$$Y = b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 \qquad (3.1)$$

Where $b_i^{'}$s are regression coefficients.

In order to test the significance of the various parameter estimates, our hypothesis

Null Hypothesis $H_{0i} : b_i = 0$, Alternative Hypothesis $H_{1i} : b_i \neq 0$

Acceptance of null hypothesis denotes that parameter estimates are not statistically significant at 5% level of significance. It means that there is no relationship between dependent and independent variable.

Table No. 3.2

Significant Analysis for Birth Rate

Variable	Year	Model	t-values & R^2
Birth Rate	1981-91	$Y_1 = 36.31 - 0.00069\ X_1 - 0.2777\ X_2 + 0.194\ X_3$	(40.38) (-4.22) (-2.39) (2.98) **R^2 =0.99**
	1991-2001	$Y_1 = 31.92 - 0.00035\ X_1 - .0183\ X_2 + 0.104\ X_3$	(14.48) (-15.38) (0.497) (-0.298) **R^2=0.99**
	1981-2001	$Y_1 = 32.696 - 0.00033\ X_1 - .2288\ X_2 + 0.4336\ X_3$	(30.285) (-.283) (-3.732) (5.570) **R^2=0.98**

Table No. 3.3

Significant Analysis for Mortality Rate

Variable	Year	Model	t-values & R^2
Death Rate	1981-91	$Y_2 = 12.09 - 0.00044\ X_1 - 0.05718\ X_2 + 0.177\ X_3$	(6.99) (-1.409) (-0.256) (1.415) **R^2 =0.90**
	1991-2001	$Y_2 = 8.526 - 0.00006\ X_1 - .123\ X_2 + 0.6058\ X_3$	(5.66) (-3.25) (-4.03) (-2.09) **R^2=0.96**
	1981-2001	$Y_2 = 11.031 - 0.00008\ X_1 - .1775\ X_2 + 0.3242\ X_3$	(13.52) -3.50)

			(-3.84) (5.52) **R^2=0.96**
Variable	**Year**	**Model**	**t-values & R^2**
Infant Mortality Rate	**1981-91**	$Y_3 = 84.53 - 0.0110\,X_1 + 2.853\,X_2 + 0.057\,X_3$	(5.46) (-2.41) (1.86) (0.67) **R^2 =0.96**
	1991-2001	$Y_3 = 55.614 - 0.00053\,X_1 - 0.379\,X_2 + 4.07\,X_3$	(2.25) (-3.25) (-0.853) (1.322) **R^2=0.94**
	1981-2001	$Y_3 = 115.26 - 0.00093\,X_1 - 2.072\,X_2 + 2.718\,X_3$	(7.276) (-3.68) (-4.13) (3.758) **R^2=0.96**

During 1981-91 the value of coefficient of multiple determination shows that the variations in per capita income (X_1), number of government hospitals (X_2) and government expenditure on health (X_3) explain 99 percent of the total variation in birth rate (Y_1). The estimates b_1, b_2 and b_3 are significant at the five percents level. During 1991-2001 the variations in per capita income (X_1), number of government hospitals (X_2) and government expenditure on health (X_3) explain 99 percent of the total variation in birth rate (Y_1). The estimates b_1 is significant but b_2 and b_3 are not statistically significant. For the year 1981-2001 the value of coefficient of multiple determination shows that the variations in per capita income (X_1), number of government hospitals (X_2) and government expenditure on health (X_3) explain 98 percent of the total variation in

birth rate (Y_1). The estimates b_1, b_2 and b_3 are significant at the five percent level. No doubt that these three determinants have their own importance as determinants causing the decline in death rate through the improvement in health status but the findings of this study show that during 1981-1991 the estimates b_1, b_2 and b_3 are not statistically significant at five percent level. Perhaps the present level of per capita income is the minimum required to cause a decline in death rate. Hence a higher rate of per capita income seems to be necessary to bring down the death rate considerable in future.

The estimated value of b_3 is positive which goes against the common observation that government expenditure on health helps in bringing down the death rate. This may be due to the fact that during the time period of this study government expenditure on health as percentage of total government expenditure showed a declining trend. It makes clear that government expenditure on health facilities is not that sufficient to bring down the death rate. This indicates the governmental inability to meet the (fixed) capital requirements of public health needs. This signals the fact that private sector has been instrumental in promoting the health status in India. In 1991-2001 the variables per capita income (X_1), number of government hospitals (X_2) and government expenditure on health (X_3) explain 96 percent of the total variation in death rate (Y_2). The estimates b_1 and b_2 are significant but b_3 is insignificant at 5 percent level. But during 1981-2001 The estimates b_1, b_2 are b_3 are significant at the same level.

In case of infant mortality rate variables during 1981-91 per Capita income (X_1), number of government hospitals (X_2), government expenditure on health (X_3) explains 96 percent of the total variation in infant mortality rate (Y_3). The estimate b_1 is significant

but b_2 b_3, are not statistically significant at five percent level. The same result is also seen during 1991-2001 while 1981-2001 as a whole all coefficients are significant.

4. Conclusion

Thus it is well recognized that human resources play very important role in economic development. Health status is one of important part of human resources which improves its quality. Health is an important goal in its own right. Health increases human potentialities of all kinds and rightly is regarded as a basic human need. Therefore it seems to be an important and relevant area of the study to analyze the health status in India. This obviously requires a search for the major determinants of the health status and its major indicators. It may also be fruitful to examine the relationship between each of the indicators and their determinants. The present study provides an implicit approach to analyze the concepts while there are many explicit models available to approve our results in the same line.

Appendix

Values of Major Determinants of Health Status

Table 1

Years	Per Capita income current prices (`)	*Number of Government hospitals per 1 million population	Government expenditure on health (in percentage)	Number of hospital beds per 1 million population
1981	1985	10	9.43	680
1982	2143	10	9.72	680
1983	2464	10	10.13	680
1984	2690	10	9.53	690
1985	2932	10	7.33	690
1986	3191	10	6.19	710
1987	3546	10	6.26	720
1988	4153	12	6.21	740

1989	4693	13	6.08	740
1990	5365	13	5.95	740
1991	6012	13	5.54	950
1992	6732	13	5.70	750
1993	7690	16	5.31	700
1994	8857	17	5.41	690
1995	10146	17	5.27	690
1996	11564	16	5.38	670
1997	12707	16	5.45	700
1998	14396	16	5.26	690
1999	15626	16	5.00	690
2000	16707	16	4.94	690
2001	17978	15	4.77	670

Source: Health Information of India 2002, Human Development Report 2005-06.

Values of major Indicators of Health Status

Table – 2

Year	Birth Rate (Per thousand population)	Death Rate (Per thousand population)	Infant Mortality Rate (Per thousand live births)
1981	33.9	12.5	110
1982	33.8	11.9	105
1983	33.7	11.9	105
1984	33.9	12.6	104
1985	32.9	11.6	97
1986	32.6	11.1	96
1987	32.2	10.9	95
1988	31.5	11.0	94
1989	30.6	10.3	91
1990	30.2	9.7	80
1991	29.5	9.8	80
1992	29.2	10.1	79
1993	28.7	9.3	74

1994	28.6	9.2	73
1995	28.3	9.0	74
1996	27.5	9.0	72
1997	27.2	8.9	71
1998	26.4	9.0	72
1999	26.1	8.7	70
2000	25.8	8.5	68
2001	25.4	8.4	66

Source: Health Information of India 2002

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