

CHAPTER 8

SUMMARY AND CONCLUSION

“It is better never to have been born, than to live a life of stupidity and ignorance as they are the roots of all misfortune”.

Aristotle

8.1 Introduction

A fundamental goal of economic development is improving the health of the people. The linkages of health to poverty reduction and long term economic growth are much stronger than is generally understood. Hence, the greatest challenge of the recent times is to provide every human being with a long and healthy life, free from poverty and full of opportunities within the community. The MDGs signed by 189 countries in 2000 set clear targets for reducing poverty and other causes of human deprivation, and for promoting sustainable development. According to the 2001 report of the World Health Organization’s Commission on Macroeconomics and Health (CMH), investment in public health in developing countries produces enormous economic benefits for the people concerned and for a country as a whole. Production function needs human capital as well as physical capital which enter as inputs. However, while schooling is often used as an input into human capital, health is not included in production function. The contribution of health to economic growth has been neglected compared with the importance given to education.

A better understanding about the health of the people is necessary if sustainable growth is to be pursued, especially for the developing countries. Health is as important as factors like productivity and schooling for the development of a country. For policy implications, health is not just a factor that affects individuals but finally the entire nation. It is important to include investment in health as a tool of macroeconomic policy because differences in the rates of economic growth among the countries have been significantly explained by differences in health, showing that investment in health triggers economic growth. Improvement of health is considered as one of the few feasible options to destroy poverty trap (WHO 1999).

The connection between health status and socio-economic development is used for monitoring and evaluating effectiveness of development policies of the countries. This has motivated researchers to explore the causality of association between health status and economic factors in terms of income and literacy rate.

To understand the connection between health and development in India, this study has used various indicators of health and economic development. It has looked into the health of the people in India through indicators such as IMR, UFMR, IMM, life expectancy and TFR. These indicators are consistently under the policy-makers' scrutiny to evaluate improvement in health.

8.2 Objectives

The present condition of health status, economic growth in the last few decades and variations in the health outcome across the states in India constituted a fertile ground to take up this study. In it an attempt has been made to understand the relationship between health and economic growth in India. Its specific objectives are as follows:

- To study the health status in India in terms of IMR, UFMR, LE, IMM and TFR; and to understand the correlation between per capita GDP, health indicators and female literacy rate;
- To study the regional inequality in health across states in India and to understand whether the regional differences have decreased over time or the gap between the richer and poorer states has decreased; and,
- To investigate the association between health status and economic growth by using the time series data and to understand the effect of short and long-run relationship between growth and health.

8.3 Data and Methodology

Studies on health and economic growth have used different measures of 'health'. Macroeconomic studies have used a variety of health indicators and come out with

different results. There are problems in establishing causality, i.e., effect of income on health and vice versa. This creates difficulty in estimating the macroeconomic relationship. Health effects in the macro economy may have long time lags. There is also the limitation of data in terms of health indicators (input, process and outcome variables). Therefore, for the present study, the relationship between economic growth and health has been analysed by using the data sets which are available in terms of time series and also for regions/states. The analysis is carried out separately for all India and for its states.

Data

This study has used the data from different sources like National Family Health Survey (NFHS 1, 2 and 3), Sample Registration Survey (SRS), Coverage Evaluation Survey (CES), Census of India, Reserve Bank of India for the four periods of 1992-93, 1998-99, 2005-06 and 2010-11, and World Bank's World Development Index (WDI). The data on NSDP and PCNSDP have been obtained from *Handbook of Statistics on the Indian Economy* published by the Reserve Bank of India. Since the data were available on different base periods, they have been transformed to 2004-05 basis by splicing method. The data on female literacy rate are based on the Census of India. Further, the data for IMR, UFMR and immunization are taken from the NFHS Reports for 1992-93, 1998-99 and 2005-06. The data for IMR and UFMR for 2010-11 are taken from Sample Registration Survey. Immunization data are taken for 2009 from Coverage Evaluation Survey, 2009.

Analysis of the time series data is conducted by using a composite database on health and economic growth collected from multiple sources in the time series framework for the period 1970-2010. The data on IMR and TFR were obtained from the *Statistical Bulletin* of Sample Registration System. The variable, GDP at factor cost, is taken at constant prices with year 2004-05 as the base from the *Handbook of Statistics of Indian Economy, 2011-12* in billion rupees. The remaining health variable, life expectancy, is obtained from the WDI and data for comparison with some other countries also from the same source.

Methodology:

We adopted different types of methods and approaches for analysing the data. Regional disparities make a significant impact on the standard of living and overall welfare in the society. As the gap between the rich and poor increases, the poor section becomes worse off as it cannot afford the quality of life. In Chapter 4, health status and its changes in India in terms of IMR, UFMR, IMM, and TFR are presented by using box plots and averages. The association between PCI and health indicators is also studied in the same Chapter. In Chapter 5 regional inequalities in health were measured to find the trend in disparities in health. In Chapter 6 a time series approach was used to understand the short and long run relationship between growth and health. This chapter also addresses the causality of two indicators under the study. For Chapter 7 a panel data approach was adopted to understand the impact of economic growth on health.

Gini Coefficient

We have used Gini Coefficient measure and Concentration Index to show the forms of inequality of health. Gini Coefficient is mainly associated with the descriptive approach to the measurement of inequality. It measures inequality among values of a frequency distribution like income. It ranges mainly between 0 and 1. The value 0 expresses complete equality, where all the values are the same. On the other hand, the value 1 expresses complete inequality. We can say that all the income is in the hands of richer section and there is no income with poorer section. Therefore a low Gini Coefficient indicates a more equal distribution, with 0 (zero) corresponding to complete equality, while higher Gini Coefficients indicate more unequal distribution, with 1 corresponding to maximum inequality. Hence, Gini Coefficient is commonly used as a measure of inequality of income. In our analysis we have used covariance method to calculate Gini Coefficient to measure inequality of income, female literacy rate and health (in terms of IMR, UFMR and Immunization).

Concentration Index

This Index is based on the concentration curve which is used to identify socio-economic inequality in a health variable. It ranks individuals/states/countries on the basis

of socio-economic features and then measures the health inequality. In doing so, it ranges between -1 and 1. We divide the sections based on the income levels, for instance, then the value -1 shows that the poorer section is completely worse off as the concentration of ill health is among them. The value 1 shows that the concentration of health variable is among the richer section. The value 0 indicates that the health variable is concentrated equally between the rich and poor. We can define this Index as a cumulative proportion of health and so is insensitive to changes in the mean level of health.

Unconditional and Conditional Convergence Models

In Chapter 5 these models are used to identify the steady paths of health and its rate of growth/decline. This is to find out whether over time the inequalities of health are decreasing across India. For this, we used unconditional beta convergence, conditional beta convergence and sigma convergence. As per Beta Conditional Convergence Model, we can determine the growth path by holding the constant variables that affect growth of income other than the initial level of income. Sigma Convergence is based on the standard deviation of coefficient of variation to see if the dispersion of the levels of income has declined or not. Using these models of economic growth, we have tried to analyse the health disparities in different regions across India and see if they have reduced over time.

Time Series Analysis

Short-run and long-run relationship between growth and health is analysed in Chapter 6. Causality of the two indicators under the study are analysed. Statistical approaches are used and analytical models estimated. Since the data are carried in the time framework for a period of 40 years from 1970 to 2010, this chapter focuses on using the time series approach. The problem with this model is that when the series are measured in time, they tend to become non-stationary or there exists the problem of auto correlation. Therefore, the time series modelling is constructed in the following steps: (1) Testing for stationarity of the series; (2) Testing of co-integration of the variables: Engle and Granger Approaches, and Auto Regressive Distributed Lags (ARDL); (3) Application of Error Correction Model, if co-integration exists; and, (4) Causality test among the variables.

Panel Data Analysis

Chapter 7 used the panel data analysis for 25 Indian states in four periods. There are many advantages of panel data over others as they give “more informative data, more variability, less co-linearity among variables, more degree of freedom and more efficiency” (Gujarati 1978). Therefore, in order to study the effect of economic growth on health, panel data were used to get more precise analysis. This has been done by within and between variables random effects (RE) estimator. RE model (not fixed effects) is used after testing for its efficiency by using both Hausman Test and Robust Hausman Test.

8.4 Health Status in India

India has specific objectives and timeline like many other countries to reduce IMR, UFMR and TFR, and to improve child immunization and life expectancy. The speed of achieving the desired health outcomes has temporal and spatial variations and is not uniform across the country, with some states lagging behind others. Madhya Pradesh, Uttar Pradesh, Orissa and Assam have IMRs above national average consistently in all the four periods. Assam, Bihar, Madhya Pradesh, Orissa, Uttar Pradesh and Rajasthan have consistently higher UFMR than the national average in three or four time periods. Rajasthan, Madhya Pradesh, Uttar Pradesh, Bihar, Arunachal Pradesh, Assam, Mizoram and Nagaland had TFR consistently higher than the national average (2.66) in 2011. Reduction in TFR is also not uniform across the states.

In Delhi, Haryana, Himachal Pradesh, Jammu & Kashmir, Punjab, Goa, Gujarat, Karnataka, Tamil Nadu and Maharashtra, the percentage of children fully immunized considerably decreased in 2009 compared with 1992. Immunization in Uttar Pradesh, Bihar, Orissa, Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura increased, though the progress was slow during the period.

Uttar Pradesh and Orissa had higher IMR during all the time periods even after much of a decline. On the other hand, Kerala and Goa had consistently lower IMR in the four time periods as compared with other states. The highest IMR in 2011 was observed in Madhya Pradesh (59) and the lowest in Goa and Manipur (11).

Over time, the percentage of full immunization improved but there was a heterogeneous distribution among the states. Thus, there are variations in the states over time. The rate of increase in immunization has not improved much from 1992 to 2009 in most states. Most variations of health indicators are by immunization across different states compared with IMR and UFMR. In some states the health quality is much better relative to other states as there is heterogeneity in the three indicators around the mean in different states. From this, it may be inferred that the states with better health status have better income and education that has improved health conditions in them.

The rate of change in health indicators from 1992-93 to 2010 varied in different regions in the country. For example, the rate of change in IMR ranged from -9.6 per cent in Jammu and Kashmir to 133 per cent in Mizoram. This means that IMR had declined 9.6 per cent and in Mizoram it increased in 2010.

The rate of increase in IMM during the period 1992-93 to 2009 indicates that the change varied from -0.31 in Tamil Nadu to around 1084 in Nagaland. The rate of change in some states was negative (in high immunization states like Tamil Nadu, Haryana, Goa, Punjab, Delhi, Jammu & Kashmir, Himachal Pradesh and Karnataka).

Some states are growing at a rapid pace in improving the health quality on the one hand, while others have lagged behind in reducing mortality rates on the other. The differences are not just in absolute terms, but also in the growth rates of health status across India.

There are regional differences in per capita income and health status (in terms of IMR, UFMR, TFR and immunization). In 2005-06 the highest IMR was in Uttar Pradesh (72.7), whereas Goa had the least IMR at 15.3. The UFMR was the highest in Uttar Pradesh (96.4), while it was the least in Kerala (16.3). Similarly, the percentage of full immunization was the highest in Tamil Nadu and lowest in Nagaland in 2005.

8.5 Regional Health Inequality in India

Inequality in terms of Gini Coefficient shows that the gap in terms of literacy levels and the overall health inequalities have fallen. There is a slight increase in

inequality in terms of IMR and in terms of income, it has increased. This implies that the gap between the richer and poorer states has increased.

Which socio-economic factors have caused the wide gap in the rates of change in health indicators in different regions? By measuring the socio-economic inequality by Concentration Index (PCNSDP), it is found that from 1992-93 to 2010-11, the concentration of IMR among the poorer states has declined. But the higher mortality rates are still prevalent among the poorer states. Moreover, the percentage of full immunization is more concentrated among the richer states across India. The richer states enjoy better health outcomes as compared with the poorer states. The level of inequality has reduced to some extent in terms of IMR, but it has risen with respect to UFMR and immunization.

The socio-economic inequality by Concentration Index (female literacy) is proved that both IMR and UFMR have higher rates among the poorer states in literacy across India. Inequality between the states with more female literacy and less female literacy has increased. The impact of female literacy rate is higher than income in controlling the levels of IMR. Also, the index value for immunization implies that the states with better education are more immunized. This proves that the female literacy rate is a relevant factor for improving the health status. If there are policy concerns in the states with lower literacy rate, then these states may also improve welfare in terms of health and the gap of health inequality across regions may reduce. The level of inequality increased in terms of IMR, UFMR and immunization with respect to female literacy.

However, inequalities of health are mainly concentrated in the poorer states (by way of income and female literacy rate). In terms of ranking based on female literacy, states with higher female literacy enjoy healthier life and higher mortality rate is prevalent among the less literate states.

The unconditional β Convergence Model is more of a static model as it does not include other factors that change health over time. In reality, the economies are more dynamic due to changes and innovations. Therefore, we looked next at the conditional convergence/divergence.

The results of conditional β convergence showed that the rate of decline increased in IMR and UFMR with increase in income and female literacy rate. The rate of immunization increased with income and female literacy rate. In terms of UFMR and immunisation, the results reject the null hypothesis and show evidence of conditional convergence. IMR showed very weak evidence of conditional convergence at 20 per cent confidence interval. The sign of PCNSDP and female literacy rate are found to be negative for regressions on IMR and UFMR as expected and a positive sign for immunisation rate. However, PCNSDP is not statistically significant. Overall, the regression result explains that there is conditional convergence with respect to health indicators with their initial absolute values across regions.

In analysing the Sigma Convergence, we have divided the regions in two sub-groups on the basis of the average of initial per capita NSDP as high income regions and low income regions. The time trend for all the regions and for two groups is significantly negative. This means that there is a decline in sigma inequality in India which is driven by a decrease in inequality in both the sub-groups defined as richer and poorer income regions.

8.6 Time Series Analysis

The broad objective of time series study for the period 1970-2010 is the causality between health and GDP. IMR and life expectancy (*le*) are used as health indicators for the analysis. By this analysis we found that IMR and GDP are co-integrated in the long-run and it takes place in the short-run. However, changes in IMR do not make an impact on changes in GDP in the short-run. The same result is obtained between life expectancy and GDP.

Granger Causality Test does not reject the null hypothesis of '*lgdp* does not Granger Cause *imr*' and reverse at 10 per cent level of significance. This implies that the causality is not clear. Granger Causality Test rejects the null hypothesis of '*lgdp* does not Granger Cause *le*' and does not reject '*le* does not Granger Cause *lgdp*' at 20 per cent level of significance. This implies that changes in *lgdp* cause a change in *le*.

The estimated coefficient of the long-run relationship by ARDL shows a significant impact of *lgdp* on *imr*. This means that economic growth has an impact on health indicator over a period of time. The same result is found for *lgdp* and *le*. The estimated coefficients of the short-run relationship shows that *lgdp* has a very highly significant impact on *imr* in India and the coefficient is significant even at 1 per cent level of significance. The same result is found for life expectancy and *lgdp*.

8.7 Health and Economic Growth: Panel Data Analysis

UFMR as a significant indicator of health status shows that there is much heterogeneity among the states over time and regions. There has been a consistently lower UFMR in Kerala and more uniformly over time. However, in the states like Tripura, the decline is not continuous. Punjab, Rajasthan, Madhya Pradesh and Uttar Pradesh have a much sharper decline in it from 1992-93 to 2011. Uttar Pradesh and Orissa have higher IMR for all the time periods even after much of a decline. On the other hand, Kerala and Goa have consistently lower IMR in all the four periods as compared with other states. The highest IMR in 2011 is observed in Madhya Pradesh (59) and the lowest in Goa and Manipur (11).

Over time, the percentage of full immunization has improved and has a heterogeneous distribution among all the states. Delhi, Haryana, Karnataka, Kerala and Tamil Nadu have higher immunization than Rajasthan, Madhya Pradesh, Uttar Pradesh, Bihar, Nagaland and Meghalaya. Thus, there are variations in the states over time and the rate of increase in immunization has not improved much from 1992 to 2009 in most states. Therefore, the range of change in immunization is very high. It shows a variety of changes in different regions and is not uniform.

Full immunization has not improved more by a higher level of income. The association between literacy rate and immunization is stronger than between per capita income and immunization. Kerala with the highest female literacy rate has very low IMR, UFMR and TFR (which are close to those of the developed countries) compared to the many other regions. There has been a continuous fall and more uniformly over time. In terms of UFMR, there is heterogeneity among the states over time and regions.

Therefore, economic growth can be treated as a narrow concept for defining the standard of living. The development issues are more relevant and complete to influence the quality of life. It is, of course, true that income levels are important for improving health status in a country. However, only better income does not reflect the true picture.

Elasticity of a health indicator (in terms of IMR, UFMR and IMM) with respect to economic growth is less than the elasticity of any health indicator with respect to female literacy rate.

How is the impact of the PCNSDP and female literacy rate on health indicators via IMR, UFMR and immunization? Many studies show that economic growth and health are related to each other. Panel data analysis tries to explain the effect of growth on health and the extent to which growth improves health quality. By analysing the impact of explanatory variables in a panel framework across different states, it is found that there is a negative relation of IMR and UFMR with both PCNSDP and female literacy, and a positive relation of immunization with PCNSDP and female literacy. These health indicators are more responsive to female literacy than PCNSDP, although the income levels are important to improve health status in a country. However, education is a vital determinant of health status of the economy because it creates awareness about the nutritional requirements, timely vaccinations and other important aspects of a healthy life.

Immunization has a maximum variation across different states in four time periods in comparison with IMR and UFMR. In some states the health quality is much better relative to the other states as there is much heterogeneity in all three indicators around the mean in different states. This also suggests that the states with better health status have higher income and education. The variables have “between variations” more than “within variations” but there is not much of a difference. All the dependent and independent variables are time-varying.

Analysis by using Pooled OLS regression shows that the coefficient values of female literacy with all health indicators are higher than the coefficient values of PCNSDP. It is found by random effects estimators that PCNSDP and female literacy have statistically significant impact on health indicators.

The impact of explanatory variables in a panel framework across different states in India shows that health indicators are more responsive to female literacy than PCNSDP, although the income levels are important to improve health status in a country.

Analysis by using different techniques shows that the impact of female literacy is higher relative to the PCNSDP in India. Therefore, it can be concluded that the role of education, higher knowledge and awareness are without doubt more important on the health system than economic growth. It is true that income levels are important to enable the people to avail themselves of the health services.

However, we need to focus on the broader aspects of development like education, income distribution, gender equity, religion and other socio-economic factors; not just economic growth to have more sustained health quality. Education creates awareness about the nutritional requirements, timely vaccinations and other important aspects needed for the health of a child.

Therefore, as a proof of access to quality health care, the indicators reflect the country's level of socio-economic development as well as quality of life. They are also used for monitoring and evaluating population, health programmes and policies. On the other hand, improvement in the standard of living by an increase in income and economic development ensures good quality of the health care system and healthy life. This motivates us to explore the causality of association between health status and economic factors in terms of income and literacy rate.

8.8 Summary and Policy Implications

Various socio-economic factors play an important role for improvement of health. In this study, we found that the role of female literacy is very important in determining health indicators. Therefore a combination of high female literacy and increase in income can bring out the best results for India.

The study shows that the impact of income on health is more at low levels of income. When the states have higher income, other important indicators may affect the

health status. Income levels are certainly important for improving the health status in the economy, but higher income alone does not reflect the complete picture.

High level of income has not increased the immunization level. Association of literacy rate with immunization is stronger than with per capita income. Kerala with the highest female literacy rate has very low IMR, UFMR and TFR (which are close to those of the developed countries) as well as high immunization level.

Achievement of better sanitation and public health leads to a reduction in mortality and improvement in health. While out-of-pocket expenses for health care remain high, quality of health services is weak in many states and public health expenditure is low compared with many other countries. Therefore, we should not ignore the role of public spending on health care.

The study demonstrates that economic growth has not protected poorer states and, therefore, inequality has increased between the richer and poorer states. Many states have not done well in health indicators. There are differences in health indicators across states. On the one side are Kerala, Goa and Tamil Nadu where the demographic transition from high to low birth, death, and population growth rates has nearly been completed. On the other side, in Uttar Pradesh, Madhya Pradesh, Rajasthan, Bihar, Orissa and Assam infant and child mortality levels remain unacceptably high by Indian standards, let alone other countries at comparable income levels.

The study suggests that the training and educational programmes need greater attention in addition to structural factors like governance for further reduction in IMR, UFMR, TFR, and improvement in childhood immunization and life expectancy in the states, especially the poor states. India was not able to bring a more rapid decline in IMR and she remains behind countries like Bangladesh (2010), Sri Lanka (1970-2010) and China (1970-2010) in its achievements in the health sector.

The level of health expenditure is very significant for improving health care as we see in developed countries. Improvement in health requires facilities for health care in the country as a whole and for all sections of people (rural and urban, and poor and rich). Health care depends on health expenditure as a percentage of GDP in both public and

private sectors. In India, total health expenditure (percentage of GDP) has not grown much since 1995. Even though health expenditure is not a main factor for improving the health of people, we should not ignore its important role in changing the health conditions and quality of health care. In India, the private health expenditure as a percentage of GDP is significantly more than the public health expenditure. The study demonstrates that economic growth has not protected poorer states and, therefore, inequality has increased between the richer and poorer states. Many of the latter have not done well in health indicators. Besides, there are differences in the health indicators across states.

India has one of the largest private health sectors in the world with over 80 per cent of health care being met by out-of-pocket expenses. Public health services are very inadequate. The public curative and hospital services are mostly in cities where only one-fourth of the 1.25 billion population of India resides. Public health expenditure (as a percentage of GDP) needs to be increased, especially in the states with poor health outcomes.

The study shows that literacy and educational attainments play a significant role in improving the health of the people. Therefore, they need to be improved, especially among the states which are educationally backward. Many public health facilities are ill-equipped and health services are inadequate and/or inefficient in many poor-performing states. By increasing the health expenditure, service provision can be strengthened. Human resources in the health sector need to be improved in terms of both quantity and quality.