

CHAPTER 7

HEALTH AND ECONOMIC GROWTH: A PANEL DATA ANALYSIS

7.1 Introduction

Health system forms an indispensable part for the society, as health is regarded as an international agenda. There are four important functions of health systems. First is the provision of health service by public and private and health facilities. The second is the need for resource generation with key inputs like human resources, physical capital and drugs and medicinal supplies. Third, the assessment of volume and sources of financial resources available for the health system, together with mechanisms for pooling and transferring them to service providers is essential. The last one is importance of the role of oversight of the health system which falls to the government and encompasses defining the vision and direction of health policy, exerting influence through regulation, and collecting and using key data related to health. Thus, these functions of health system are directed towards improving the health facilities and their reach to the people. If we talk about the developing countries, there is an additional need to provide equitable, efficient and good quality health systems. This is required to improve the health of people as observed by indicators like IMR, MMR, immunization, UFMR, life expectancy and so on.

National Rural Health Mission was launched in India in 2005 with the goal of providing universal access to equitable, affordable and quality health care which is accountable at the same time responsive to the needs of the people, reduction of child and maternal deaths, population stabilization, as well as gender and demographic balance. It is important to realize that the health status in India has substantially improved in the last decade. However, it is yet too far away from the targets of MDGs. We briefly review the condition of health indicators in India in the following paragraphs.

7.2 Health Status in the States of India

Under Five Mortality Rate: One of the important indicators of health, UFMR (the rate defined as the annual number of children dying between birth and exactly five years of age and is expressed per 1000 live births), is considered as an important indicator of health because it is regarded as dependent on broad socio-economic factors such as female education, access to preventive and curative health services, immunization coverage, safe drinking water, nutrition intake and sanitation.

Figure 7.1 Trends in Under Five Mortality Rate

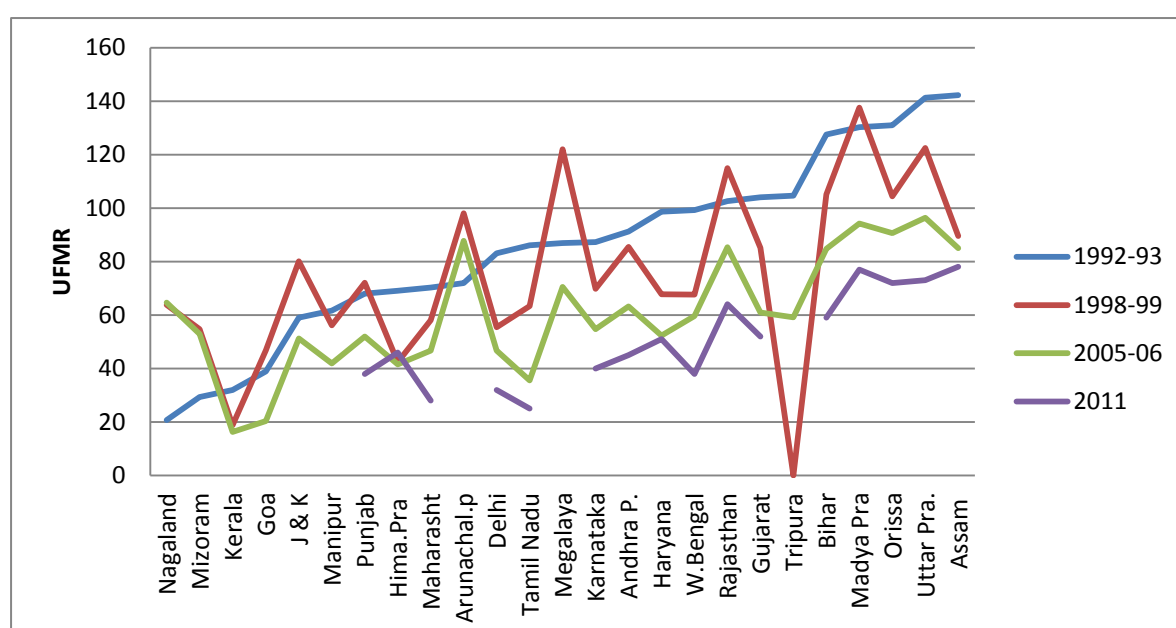
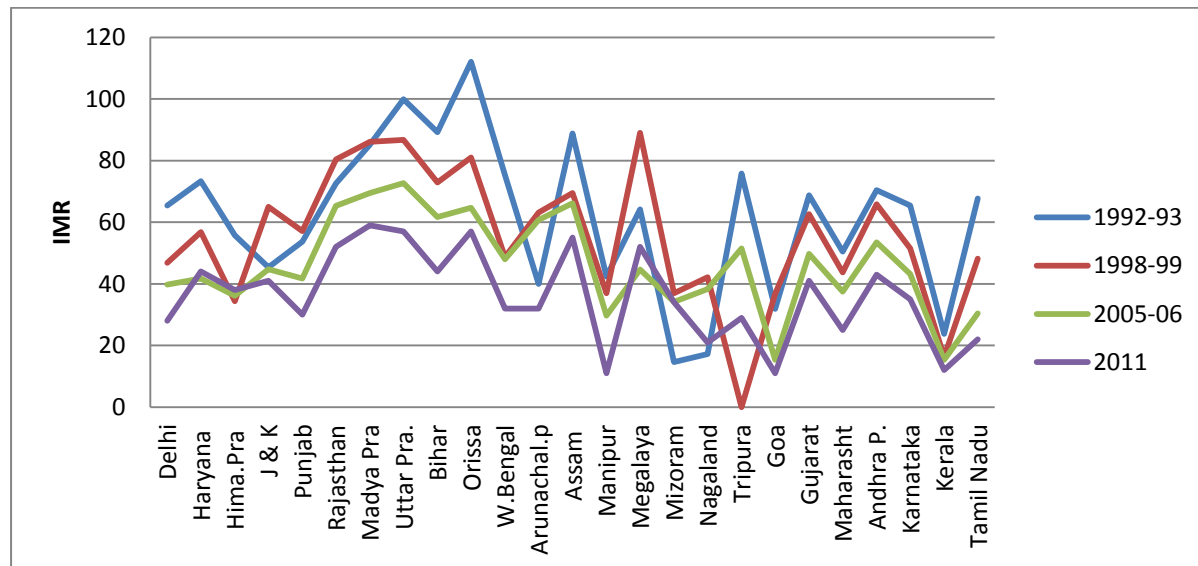


Figure 7.1 shows the trends of UFMR in four periods of time in different states. There is much of the heterogeneity among the states and the regions over time. There has been a consistently lower UFMR in Kerala and it has seen a continuous fall. However, in the states like Tripura, the fall is not continuous. It rose again in 2005-06 after a steep fall in 1998-99. Further are other trends in remaining states. The states like Punjab, Rajasthan, Madhya Pradesh and Uttar Pradesh have a much sharper decline in it from 1992-93 to 2011. However, in states like Kerala the change in it is relatively small, but the absolute figures also show less UFMR since 1992-93. This means its trends are more uniformly distributed over time.

Infant Mortality Rate: Another important health indicator that has been considered is IMR which is defined as the number of deaths in children of less than one year of age per 1000 live births in the same year. It is regarded as a highly sensitive (proxy) measure of population health. It reflects the association between the causes of infant mortality and other factors that are likely to influence the health status of whole population such as the economic development, general living conditions, social well-being, rates of illness and the quality of environment.

Figure 7.2 shows the trends of IMR over time in different states for four periods of time. The trends are more or less similar to that of UFMR as shown in Figure 1. The relatively less developed states like Uttar Pradesh and Orissa have higher IMR in all the time periods even after much decline. On the other hand, more developed states like Kerala and Goa have consistently lower IMR in all the four years as compared with other states. The highest IMR in 2011 is observed in Madhya Pradesh (59) and the lowest IMR in Goa and Manipur (11).

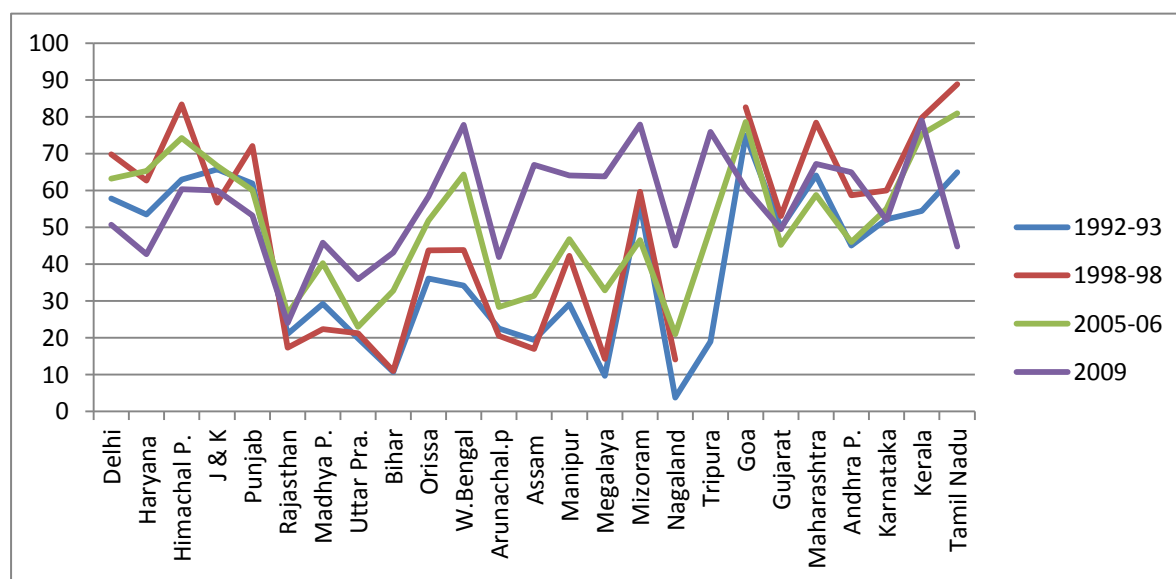
Figure 7.2 Trends in Infant Mortality Rate



Immunization: Finally, we talk about immunization which is widely regarded as a good proxy for the overall strength of a government’s public health system. It is designed to measure the extent to which governments are investing in the health and well-being of their citizens. Moreover, it affects the economic growth as the healthy workers are more economically productive, and more likely to save and invest; healthy children

are more likely to reach higher levels of educational attainment; and healthy parents are better able to invest in the health and education of their children. Immunization programmes also increase labour productivity among the poor, reduce spending to cope with illnesses, and lower mortality and morbidity among the main income-earners in poor families.

Figure 7.3 Trends in Full Immunization Rate



As shown in Figure 7.3, the percentage of full immunization has a heterogeneous distribution among all states. For instance, the states like Delhi, Haryana, Karnataka, Kerala and Tamil Nadu have comparatively higher immunization than Rajasthan, Madhya Pradesh, Uttar Pradesh, Bihar, Nagaland and Meghalaya. Over time, the percentage of immunization has improved. However, in a few states like Delhi, Haryana and Himachal Pradesh, it has fallen in 2009. Thus, the nature of distribution is highly skewed. The highest percentage of immunization in 2009 was in Mizoram (77.9) which increased by approximately 67 per cent since 2005-06. However, the highest percentage of immunization in 2005-06 was in Goa (78.6) which declined to 60.6 per cent by 2009. Thus, there are variations in the states.

Health status is affected by many socio-economic factors. In the literature of health economics, the most important factors that have been considered important for affecting health care are income, poverty and education as economic factors; and early marriages, religion, caste gender, etc. as cultural and social factors. These factors are

major determinants of health and well-being because people with a more favourable socio-economic position have better health compared with those who are less well off. These determinants, therefore, strongly interact to influence health and, in general, an improvement in any of them can produce an improvement in both health behaviour and outcomes among individuals or groups. For instance, female literacy is considered as an important determinant of health as it creates information access, all the prenatal and post natal care, improved nutrition and medical care.

This chapter essentially focuses on the two major determinants of health: (a) PCNSDP as a proxy for economic growth and (b) female literacy which is also considered as one of the variables for economic development. The primary focus is to understand the effect of economic growth on health status in India. The association of economic growth with health has widely been discussed in the literature. However, many of the arguments are based on the effect of health on economic growth. Therefore, the present study attempts to understand this association and to know whether economic growth has any influence on health? If so, then how strong is it as a determinant of health? Can we say that a country with good economic growth can improve its health status significantly? Or, is it that if economic growth influences health, then after a certain achievement, its impact increases only with decreasing rate? Then, do we need to move to a much broader definition of growth by focusing on development indicators like female literacy that can improve the health status? Before moving to the analysis, the nature of association of economic growth and female literacy with health will be briefly reviewed.

7.3 Economic Growth and Health

Much of the literature of the association between health and economic growth is embedded with the causality of health on economic growth. This is mainly based on the argument that labour productivity is one of the important pre-requisites of economic growth. Health and education improve labour productivity. In addition, there are assertions that with higher life expectancy (an indicator of health), individuals save more which adds to capital accumulation and, therefore, GDP. With higher life expectancy, individuals are likely to invest more in education which is growth enhancing.

On the other hand, some macroeconomic studies of health and income considers the question whether health determined by economic growth? This is based on the argument that if there is growth in the economy, investment in health increases that improves health services and their reach to the people. Besides, growth boosts investment in other sectors like education that strengthen the socio-economic factors that promote health.

This chapter attempts to understand the impact of economic growth on health and see if causality exists, then how strongly does economic growth helps to improve the health quality.

Figure 7.4 shows the trends of health indicators and economic growth at four points of time. It is observed that GDP has increased since 1992-93 and the rate of increase is much faster after 1997. Immunization has not increased fast in all the periods, also IMR and UFMR have decreased slowly over time. If we look at the health indicators (IMR and UFMR), the graphs are much smoother from 1992 till 2011. The percentage of immunization has increased over time uniformly. Similarly, there is a continuous and smooth fall in IMR and UFMR at four points of time.

Figure 7.4 Pattern of Economic Growth and Health Overtime

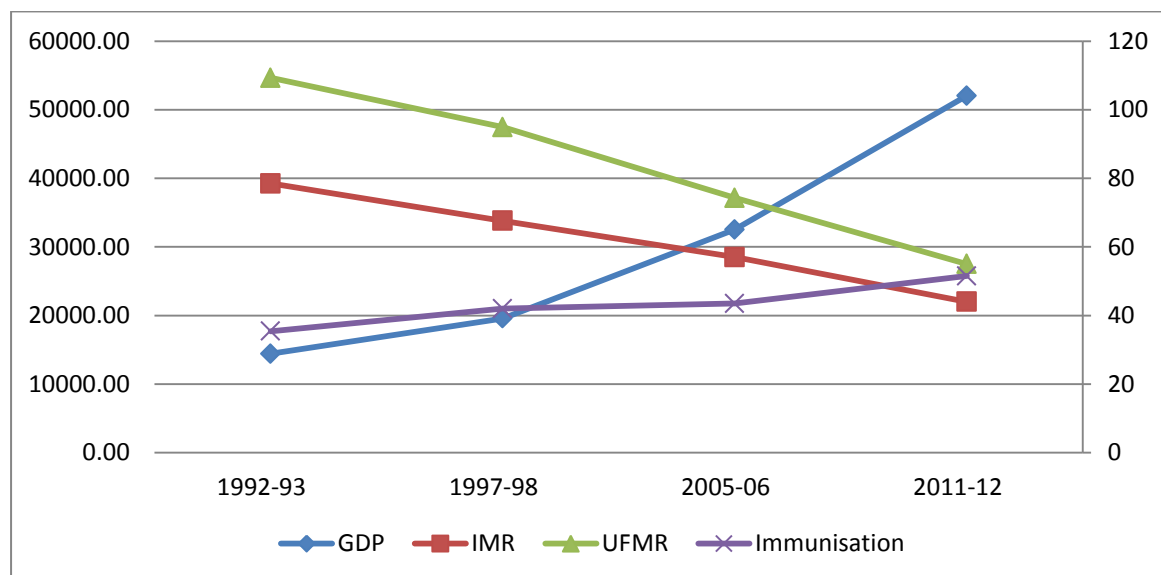


Figure 7.5 depicts the pattern of change in GDP and change in the values of health indicators over time. The GDP has a steeper slope from 1997-98 to 2005-06. In this

period, the slope of change in health indicators, especially IMR and UFMR, is relatively much flatter. This reflects that when there was a high rate of increase in GDP, the rate of health indicators was less, meaning thereby that there must be many other relevant factors that influence health. This is not to say that economic growth is not an important factor of health. It just means that economic growth is one of those important factors that affect health.

Figure 7.5 Percentage of Change in Economic and Health Variables Overtime

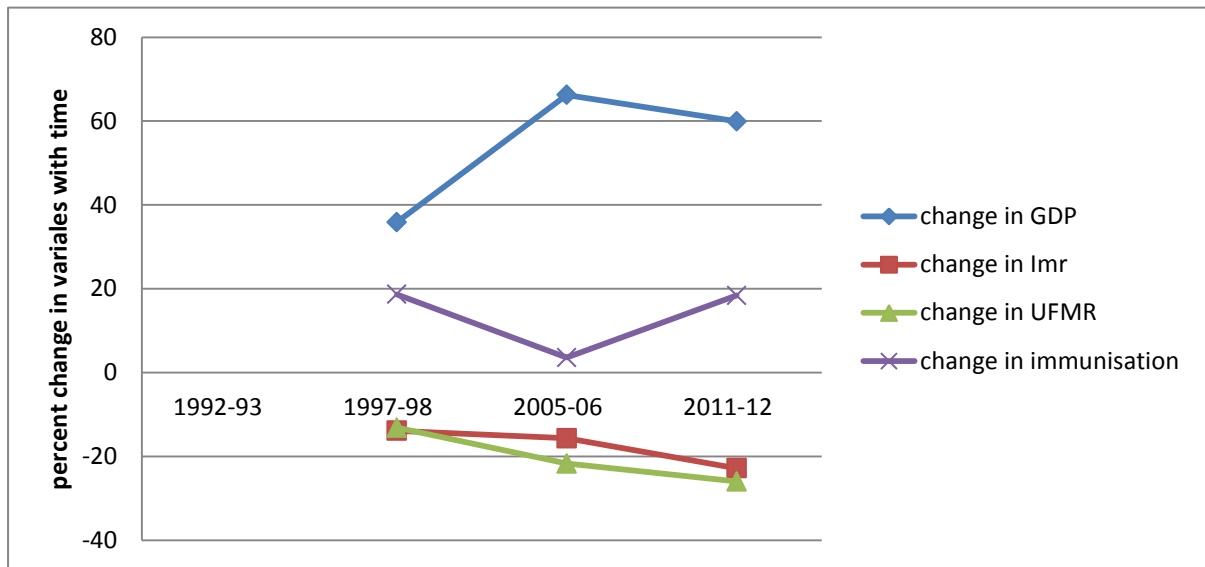
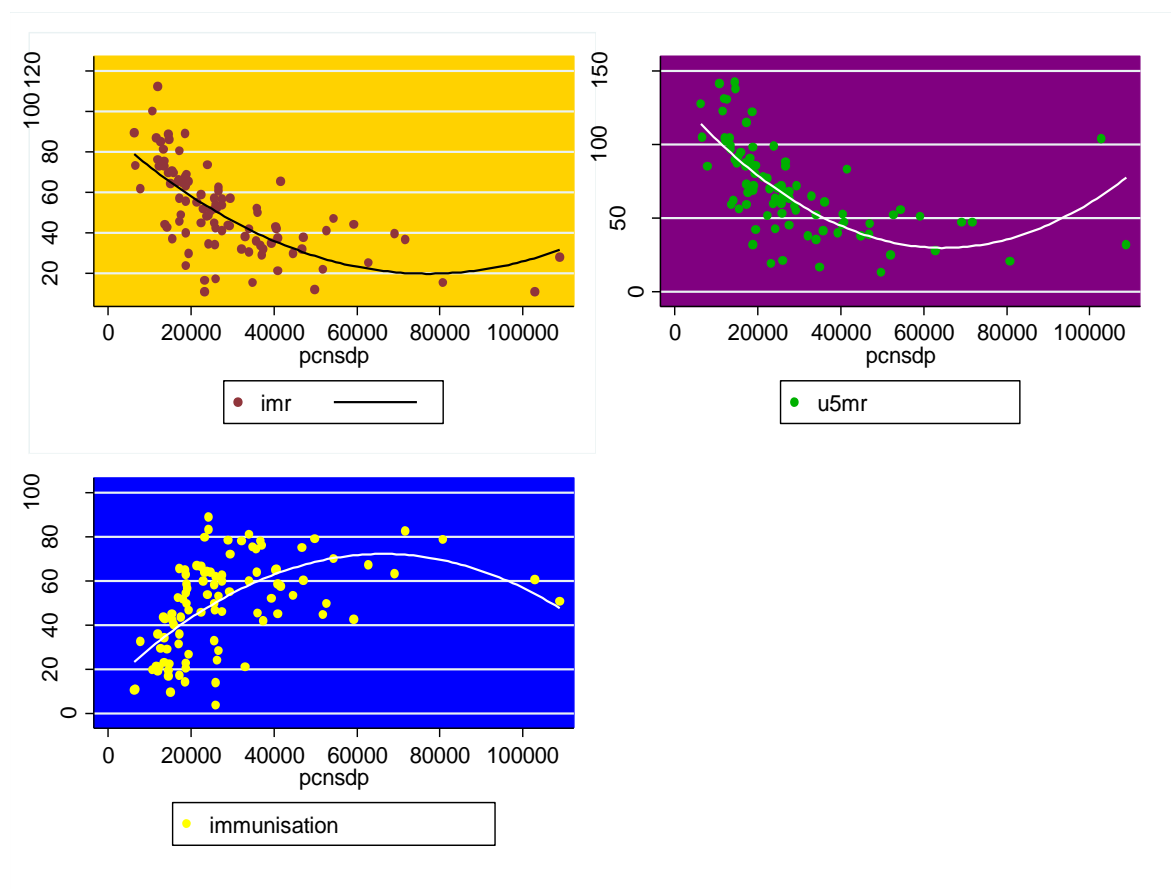


Figure 7.6 shows that there is some association of the health indicators with economic growth, and so there is some relevance between the two. The important thing to observe is that after some value of PCNSDP, the relationship of the entire health factors shows relatively flatter slope. This means that after attaining some level of growth, the impact of economic growth becomes relatively less. This again points out that there must be some other factor that improves the health status at the higher rate.

Various studies by authors like Bhalotra (2001) and Hanmer (2000) explain economic growth as an important indicator of health. Economic growth boosts more expenditure on health services that may improve health status. Thus, it is a relevant determinant.

Figure 7.6 Association of Health Indicators with PCNSDP

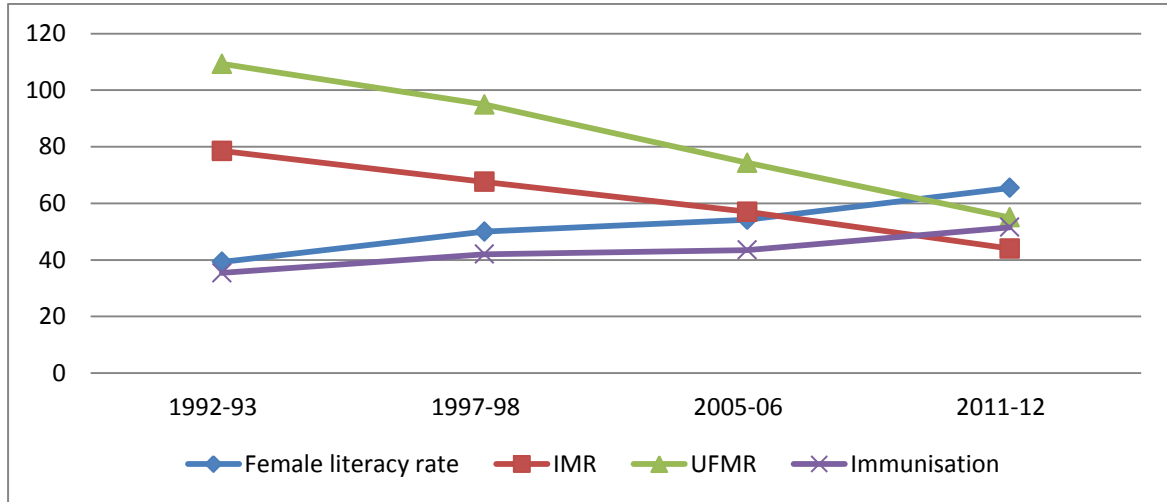


7.4 Female Literacy and Health

It is been argued by health economists that female literacy is one of the most important determinants of health as it brings a more sustained impact in the wellbeing of the people. Literate females are aware about the nutritional requirements, good health care, immunization benefits, pre and post natal care, etc. So, female literacy is considered as an important factor for improving health. Also, females are likely to be aware of the vaccinations needed and available for their children which reduce the chances of many diseases and, therefore, the IMR and UFMR. Sen (1998) provides the example of Kerala whose success is related to its high level of basic education. Literacy among young adult women in Kerala is close to 100 per cent which is the reason for a less gender bias which reflects less discrimination among girls and, therefore, lower infant mortality indirectly. Furthermore, lack of education also adversely affects women's health because of likelihood of less knowledge about nutrition, birth spacing and contraception which increases the chances of maternal deaths.

In Figure 7.7, the pattern of female literacy and health indicators is shown. Female literacy has increased slowly over time; the rate of increase is less compared to GDP.

Figure 7.7 Patterns of Female Literacy Rate and Health Indicators



Moreover, the slope of female literacy curve is much flatter whereas the slopes of IMR and UFMR curves are steeper. This is observed in Figure 7.8 where the percentage change in the variables over time is shown. Slopes of all the indicators are relatively steeper. This means that there is a possibility that the impact of female literacy rate on health indicators is stronger than that of PCNSDP.

Figure 7.8 Percentage of Change in Health Variables Overtime

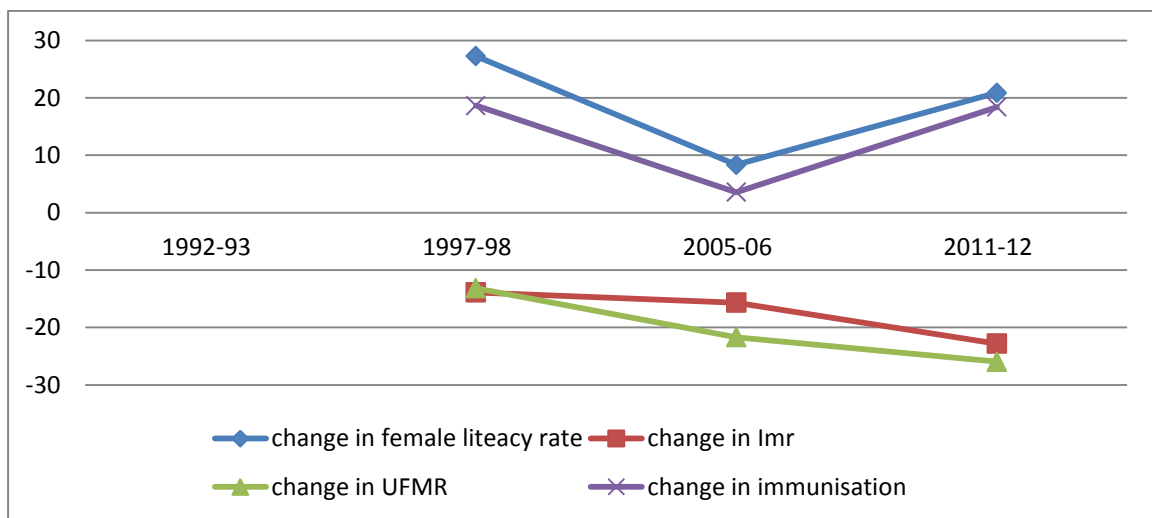
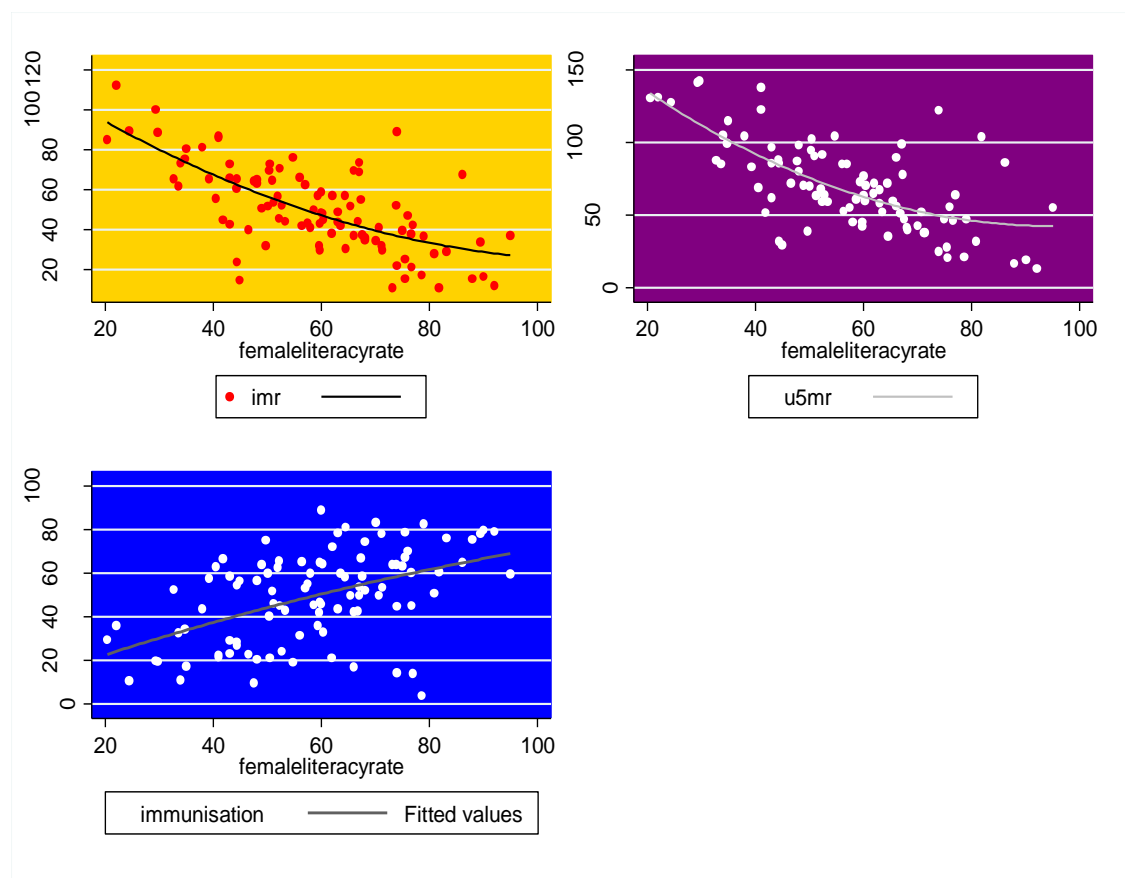


Figure 7.9 shows close association of female literacy with each of the health indicators. The slopes of the health indicators with respect to the distribution over states and time for female literacy rate are more continuous. However, the association of these indicators with PCNSDP (as shown before) becomes flatter after a certain level of PCNSDP. This could mean that the output of PCNSDP increases at a diminishing rate after a certain level. However, female literacy is a more continuous variable to link with health indicators. This again suggests that female literacy may be a more important determinant of health.

Figure 7.9 Association of Health Indicators with Female Literacy Rate



7.5 Elasticity of Health with respect to PCNSDP and Female Literacy Rate

If we look at the elasticity of health with respect to PCNSDP and female literacy, Table 7.1 shows that the elasticity of any of the health indicators with respect to economic growth is less than the elasticity of any of the health indicators with respect to female literacy rate.

Thus, this leads us to look into the role of economic growth on health more vividly. If we rely on economic growth, then to what extent can it be considered to be a boosting determinant of health? Is it that we need some policies to work on broader aspects like that of taking female literacy rate as one of the key determinant of health and frame policies that work on these aspects to improve the quality of life? Thus, we attempt to understand the role of economic growth and female literacy to reach answers of these questions.

Year	Elasticity of health with respect to PCNSDP			Elasticity of health with respect to Female Literacy rate		
	Elasticity of IMR	Elasticity of UFMR	Elasticity of IMM	Elasticity of IMR	Elasticity of UFMR	Elasticity of IMM
1998-99	-0.0021	-0.9488	0.5199	-0.2549	-2.7818	0.9009
2005-06	-0.0008	-1.3843	0.0539	-1.3939	-1.8980	0.8400
2011-12	-0.0006	-1.1389	0.3068	-1.0386	-1.3718	0.8031

Source: Based on the author's calculation

7.6 Objective of the Analysis

The broad objective of the study is to understand the effect of economic growth on health, if any. Also, if significant impact on economic growth exists, then the study will try to find out how important is economic growth as a determinant of health. Is growth a necessary as well as sufficient condition to improve health? Or, do we need to look at the broader idea of growth, that is, development factors like female literacy to improve the quality of life? In other words, an attempt is made to answer the following questions:

1. What is the impact of economic growth and female literacy rate on IMR, UFMR and immunization?
2. Is the impact of economic growth on health greater, equal or less than the impact of female literacy rate on health indicators?

The above questions are addressed in this chapter by using the panel data analysis. There are many advantages of panel data over others like cross sectional data because they relate individual observations (states in our case) over time. Therefore, by combining time series of cross-section observations, panel data give “more informative data, more

variability, less collinearity among variables, more degree of freedom and more efficiency” (Gujarati 2004, 4th ed.). In addition to this, panel data are responsive to change as they study the repeated cross-section of observations. They can better detect and measure effects that simply cannot be observed in pure cross-sectional form. Therefore, in order to study the effect of economic growth on health, panel data can make possible more enriched analysis.

Female Literacy, Per Capita Income and Health

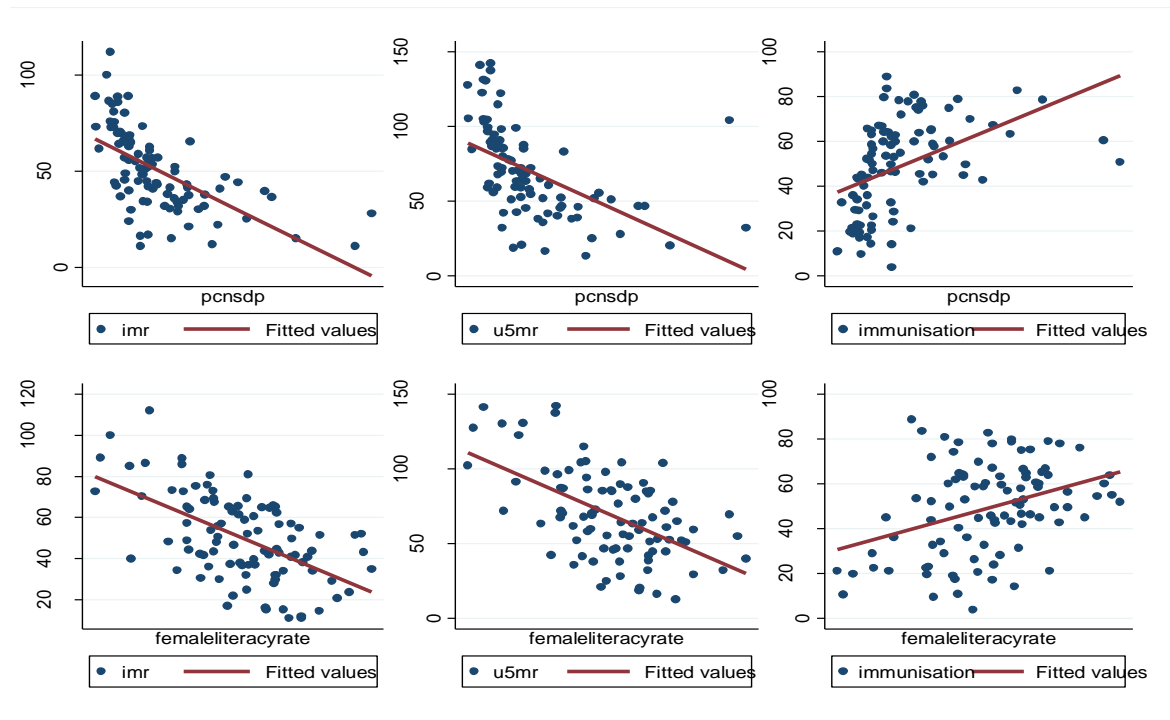
The main objective of this chapter is to study the impact of the PCNSDP and female literacy rate on health indicators via IMR, UFMR and immunization. Broadly, it seeks to find out if economic growth can improve the health quality or is it too narrow to define a variable for health status? Also, if economic growth helps in boosting the health quality, how far can we depend on it?

This chapter is focused on analysing the impact of explanatory variables in a panel framework to understand the variations across different states. There are many studies that show that economic growth and health are related with each other. However, the literature is much focused on how health determines economic growth. The present analysis tries to understand the effect of growth on health and the extent to which it enhances health quality.

Graph 7.1 shows the relation between health indicators on the one hand and PCNSDP and literacy rate on the other. The results showed negative relation of IMR and UFMR with both PCNSDP and female literacy rate, but show a positive relation of immunization with PCNSDP and female literacy rate. It indicates that the graphs of relation of female literacy rate with that of IMR and UFMR are slightly higher than with that of PCNSDP. The health indicators are more responsive to female literacy than PCNSDP. This gives some ground to conclude that the income levels are important to improve the health status in a country. However, the role of education is much more important in improving the quality of life of the people by improving the health. It can also be inferred that there is a threshold till the point where incomes are important. It plays a more immediate role. But to have a sustained impact on health over time, education is a vital determinant of health status of the economy because it creates

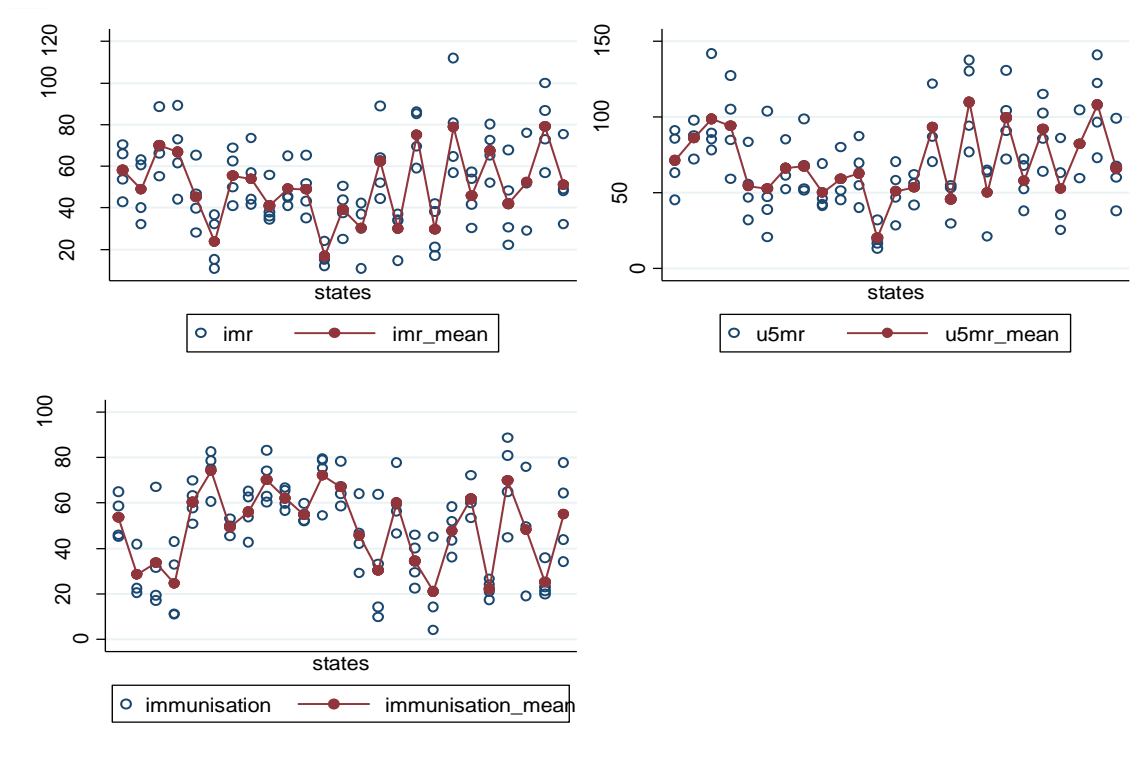
awareness about the nutritional requirements, timely vaccinations and other important aspects needed for the health of a child.

Graph 7.1 Relationships of Health Indicators with PCNSDP and Female Literacy



Graph 7.2 shows variations in IMR, U5MR and immunization across different states with respect to their respective mean values of the four time periods. Most of the variations in different states are by immunization in comparison with IMR and U5MR. There is also much of the heterogeneity in all the three indicators around the mean in different states. This means that in some states, health quality is much better relative to other states. This may also infer that the states with a better health status have better income and education that has improved general health in those states.

Graph 7.2: Variations in Health Indicators in the States



A Panel Data Analysis

The data are found to be strongly balanced carrying all observations with respect to states and time. The analysed models are as follows:

$$IMR_{st} = \alpha_{1s} + \alpha_2 Y_{2st} + \alpha_3 FL_{3st} + \mu_{st}$$

$$UFMR_{st} = \beta_{1s} + \beta_2 Y_{2st} + \beta_3 FL_{3st} + \epsilon_{st}$$

$$IMM_{st} = \gamma_{1s} + \gamma_2 Y_{2st} + \gamma_3 FL_{3st} + e_{st}$$

Where $s = 1, 2, \dots, 25$ that are states, and t shows time periods

In these equations, Y is defined as PCNSDP for different states in four time periods as a proxy for economic growth. The variable FL defines the female literacy rate for various states for the same time periods. Considering these two as the explanatory variables, the study seeks to analyse their impact on IMR, UFMR and immunization which are taken as the indicators of health.

I. Within and Between Variables

Dependent variables and regressors can vary over both time and states. Sometimes the variables vary over time or a given state which is called “within variables” and some variables vary across states which are called “between variables”. It is important to analyse such nature of the variables because estimators differ in their use of within and between variables. In other words, if we use a fixed model, the coefficient of the regressor with little within variation will be imprecisely estimated and will not be identified if there is no within variation. Thus, we have first tried to analyse the nature of all the variables. The table below depicts that there is no variable that has zero time invariant which implies that all the variables are time invariant and change over time. Although the variables have between variations more than within variations, there is not much of a difference.

Variable		Mean	Std. Dev.	Min.	Max.	Observations
Id	Overall	13	7.25	1	25	N = 100
	Between		7.36	1	25	n = 25
	Within		0	13	13	T = 4
T	Overall	2.5	1.12	1	4	N = 100
	Between		0	2.5	2.5	n = 25
	Within		1.12	1	4	T = 4
IMR	Overall	50.39	21.23	11	112.1	N = 99
	Between		16.91	16.85	79.07	n = 25
	Within		13.06	27.29	83.79	T-bar=3.68
UFMR	Overall	69.66	30.25	13	142.2	92
	Between		22.83	20.02	109.77	25
	Within		19.77	34.36	121.16	3.68
IMM	Overall	49.10	20.66	3.8	88.8	99
	Between		17.13	20.97	74.17	25
	Within		11.80	19.90	82.73	3.96
FLR	Overall	58.76	16.52	20.44	95	98
	Between		11.57	36.31	78.55	25
	Within		12.00	24.55	79.32	3.92
NSDP	Overall	**967.5	1144.68	18.40	7028.3	94
	Between		1026.55	30.75	4011.3	25
	Within		588.43	-969.54	3984.5	3.76
PCNSDP	Overall	*28929.3	18379.6	6256.96	108876	98
	Between		15163.2	8578.84	75546.8	25
	Within		10505.7	186.28	69266.6	3.92

Source: Based on the author's calculation. *Rupees, ** Rupees in Billion

II. Pooled OLS Regression with Cluster-robust Standard Errors

All the dependent and independent variables are time-varying. So we try to find pooled OLS regression for IMR, UFMR and immunization. For the panel data, it is important that OLS standard errors are corrected for clustering on the individual. Since the error term is likely to be correlated overtime for a given individual, we use cluster-robust standard errors. If we use default standard errors, the regression errors are i.i.d, which may be a misleading assumption. Thus, by using the robust standard errors, we find the results shown in Table 7.3.

Table 7.3 Pooled OLS Regression with Cluster-robust Standard Errors						
Variables	Coefficients	Roust sd. Error	p-value	N	F- statistics	R ²
With respect to IMR						
PCNSDP	-0.0003196	.0001411	0.033	95	F(2, 24) = 45.37	0.5684
Female literacy R.	-0.721549	.1486366	0.000			
Constant	102.5165	6.599268	0.000			
With respect to UFMR						
PCNSDP	-0.0002447	.0002249	0.288	88	F(2, 23) = 29.91	0.4937
Female literacy R.	-1.14019	.2009428	0.000			
Constant	142.7055	10.11236	0.000			
With respect to Immunization						
PCNSDP	0.0002673	.0001348	0.059	95	F(2, 24) = 15.40	0.2840
Female literacy R.	0.4607379	.1885461	0.022			
Constant	14.10025	8.679064	0.117			

Source: Based on the author's calculation

Both PCNSDP and female literacy rate are statistically significant at five per cent confidence interval which means that both affect the health indicators. It is interesting to see that the coefficient values of female literacy with all health indicators are higher than the coefficient values of PCNSDP. For example, change in IMR due to a change in female literacy rate is -0.72155 and the change in IMR due to a change in PCNSDP is -0.00032. This means that a unit increase in female literacy rate causes IMR to decrease by 0.72 while a unit increase in PCNSDP decreases IMR by an average of 0.03 only. This means that the impact of female literacy is higher relative to the PCNSDP.

III. Hausman Test

To know whether to use Fixed Effects (FE) model or Random Effects (RE) model, we essentially use Hausman test. Statistically, FE are a reasonable thing to do with panel data as it always gives consistent results. But may not be the most efficient model to run and RE gives better P-values as it is a more efficient estimator. Hausman test checks a more efficient model against a less efficient but consistent model to make sure that the more efficient model also gives consistent results. Thus, we use Hausman test under the null hypothesis that individual effects are random. We get the following results:

Variables	Coefficients			
	(b)	(B)	(b-B)	sqrt(diag(V_b-_B))
PCNSDP	-0.00057	-0.00045	-0.00012	0.00007
Female literacy rate	-0.42092	-0.54194	0.12102	0.054072

Source: Based on the author's calculation

b = consistent under Ho and Ha; obtained from *xtreg*

B = inconsistent under Ha, efficient under Ho; obtained from *xtreg*

Test: Ho: difference in coefficients not systematic

$$\chi^2(2) = (b-B)'[(V_b-V_B)^{-1}](b-B)$$

$$= 5.13$$

$$\text{Prob}>\chi^2 = 0.0769$$

We tend not to reject the null hypothesis which means RE model is suitable to our data and, therefore, we rely on RE estimator.

Robust Hausman Test: There is a shortcoming in the standard Hausman test in that it requires the RE estimators to be efficient. This, in turn, requires that all the coefficients and standard errors are i.i.d which is an invalid assumption if cluster-robust standard errors for the RE estimators differ substantially from the default standard errors. Therefore, we do a robust version of Hausman test to overcome such a problem. We find that the p-value of F statistics is 0.0582, which is statistically insignificant at 5 per cent interval. Thus, the tests do not reject the null hypothesis and we conclude that the RE model is appropriate.

$$F(2, 90) = 2.94, \quad \text{Prob}>F = 0.0582$$

Random Effects Estimators

The RE estimator is a feasible generalized least-squares (FGLS) estimator in the RE model as defined in the equations (mentioned in Chapter 3) under the assumption that the random effect (the constant terms) is i.i.d and the idiosyncratic error is i.i.d. The RE estimator is consistent if the RE model is appropriate which we proved to be so by Hausman test and robust Hausman test.

The RE model considers the equation:

$$Y_{st} = X_{st} \pi + (\xi_s + e_{st}) \text{ with } \xi_s \sim (\xi, \sigma^2_{\xi}) \text{ and } e_{st} \sim (0, \sigma^2_u)$$

The RE estimator is the FGLS estimator of π for the corrections.

The results are mentioned below:

i) With IMR

PCNSDP and female literacy are statistically significant at 5 per cent confidence interval. A unit increase in PCNSDP decreases the IMR in average 0.0004 and a unit increase in female literacy rate decreases IMR by 0.54. This also means that female literacy has more impact on IMR than PCNSDP.

Table 7.5 The RE Estimator with IMR

Robust IMR	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
PCNSDP	-0.0004	0.00014	-3.14	0.002	-.0007	-.00017
*FLR	-0.54	0.1444	-3.75	0.000	-.825	-0.259
_cons	95.92	6.99	13.72	0.000	82.21	109.62
Sigma_u	8.87					
Sigma_e	10.572					
Rho	.413 (fraction of variance due to u_i)					

Source: Based on the author's calculation. * Female literacy rate. All numbers have been rolled to the short digit by author.

ii) With UFMR

Table 7.6 shows that female literacy rate has statistically significant impact on UFMR. A unit increase in PCNSDP decreases the UFMR by 0.0003 and a unit increase in

female literacy rate decreases UFMR by 1. This also means that female literacy has more impact on UFMR than PCNSDP.

Table 7.6 The RE Estimator with UFMR

Robust UFMR	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
PCNSDP	-.0003	0.00026	-1.15	0.250	-.0008	.00021
FLR	-1.0004	0.20500	-4.87	0.000	-1.4	-.598
_cons	136.5	10.630	12.84	0.000	115.67	157.34
sigma_u	9.279					
sigma_e	19.43					
rho	.186 (fraction of variance due to u_i)					

Source: Based on the author's calculation. All numbers have been rolled to the short digit.

iii) With Immunization

Table 7.7 shows that immunization is significantly affected by female literacy. A unit increase in PCNSDP increases IMM by 0.00005 and a unit increase in female literacy rate increases IMM by 0.47 per cent. This also means that female literacy has more impact on IMM than PCNSDP.

Table 7.7 RE Estimator with IMM

Robust IMM	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
PCNSDP	.00005	.0001	0.42	0.673	-.0002	.0003
FLR	.4749	.105	4.52	0.000	.2689	.6808
_cons	19.736	7.14	2.76	0.006	5.74	33.73
sigma_u	12.061					
sigma_e	12.62					
rho	.477 (fraction of variance due to u_i)					

Source: Based on the author's calculation. All numbers have been rolled to the short digit.

This shows that immunization is significantly affected by both the factors and the female literacy is much important to increase immunization than income.

Therefore, it can be concluded that the role of education is 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 of the health services. However, to have more

sustained health quality, we need to focus on the broader aspects of development and not just economic growth.

In this chapter it is found that UFMR has decreased in India and its states but not uniformly. Uttar Pradesh and Orissa have higher IMR in all the time periods. Full immunization has improved but with a heterogeneous distribution among the states. The highest percentage of full immunization in 2009 was in Mizoram (77.9). There are lots of variations in the states over time. True, health status in India has improved over time, but not uniformly and there is lot to be done.

The rate of economic growth of India has increased since 1992-93 and the rate of increase is much faster after 1997. We found that immunization has not increased fast in all the periods. Besides, the rates of decrease in IMR and UFMR are slow over time. It shows that there are many other factors that can affect health. We cannot ignore the significant role of economic growth on improving health. It just means that economic growth is one of the factors that affect health over time.

The association between health and economic growth indicates that there is a close connection between them. The impact of economic growth on health becomes relatively less after attaining a certain level of growth. This suggests that there are other factors that improve the health status at the higher level. Panel data analysis shows that female literacy has much more impact on IMR, UFMR and IMM than PCNSDP. Therefore, it can be concluded that the role of education is without doubt more important on health.