RESEARCH ARTICLE

SOCIO-ECONOMIC DETERMINANTS OF HEALTH OUTCOMES IN INDIA

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ABSTRACT

The present study attempts to highlight the socio-economic determinants of health outcomes in India. The study investigates the relationship between infant and child mortality and socio- economic factors of health outcomes. The important socio economic factors are household income, female education, standard of living, social class etc. It is well acknowledged that improvement in income, level of education, literacy rate, mother education etc have positive impact not only on general health status of the people, but also on children's overall growth and development. Further, the study analyze the socio-economic determinants of health outcomes and their impact on Infant Mortality Rate and Under Five Mortality Rate.In this study, the indicators that obtained after carrying out PCA are index for Socio Economic status (ISES), index for Demographic status (IDS) and index for Environmental Status (IES), index for Maternal Health (IMH) Index for Malnutrition (IMAL) and Index of Child Health Immunization (ICHI).In order to investigate the relationship between variables Regression Analysis has been used. In Linear regression model, the dependent variables, the health outcomes are assumed to a linear function of independent variables i.e. the prepared indices. Demographic Regression value are (-.765) and U5MR value are this show the negative impact of IDS on U5MR.

INTRODUCTION

Health is a fundamental human right and a worldwide social goal. Health is necessary for the realization of basic human needs and to attain the status of a better quality of life. Improving the quality of growth is an important goal of the development archetype in many developing countries. Better health, education, equal and wider job opportunities to all, trustworthy and transparent people's intuition, sustainable and cleaner environment, dignity, self-esteem and life security, among others, are key manifestations of the quality of growth (WB, 2000). Some important health outcomes that reflect the health status of the society are Infant mortality rate, under five mortality rate, Maternal Mortality Ratio, crude Death rate and Life expectancy at Birth etc. Among them, IMR and U5MR are most important as they paint the real picture of the wellbeing of the children and the society too. They are also widely accepted assessor of a variety of intervention programme designed for improving child health. Now, the factors affecting infant and under-five mortality vary between geographical regions, between cultural groups and also between different economic status, socioeconomic status of the people has a large influence on child mortality. In developing countries poor access to health care facilities may be a major factor behind infant and under- five mortality.

Some important factors influencing health outcomes, especially infant mortality and under five mortality can be categorized as socio economic, demographic and environmental factors. The important socio economic factors are household income, female education, standard of living, social class etc. It is well acknowledged that improvement in income, level of education, literacy rate, mother education etc have positive impact not only on general health status of the people, but also on children's overall growth and development. The rest of the paper organized as follows. Section 2 present the data source and methodology are discussed and 3rd section explained the socio-economic determinants of health outcomes and explained the relationship between infant and child mortality and socio economic factors of health outcomes. The sub-section 3.1 explained the socio- economic factors such as mother education, standard of living .Section 4 analyze the socio-economic determinants of health outcomes and their impact on Infant Mortality Rate and Under Five Mortality Rate. Section 5 presents the result of study. Finally, the conclusion can be found in section 6.

DATA SOURCE AND METHODOLOGY

For the purpose of this study, secondary data has been used. The data has been collected from various issues of SRS bulletin, International Institution of population science (IIPS) , Sample Register system, office of the registrar general India, National Family Health Survey-3,4&5, Ministry of Health and Family Welfare, Government of India.

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OBJECTIVES OF STUDY

- To study the relationship between infant and child mortality and socio economic factors of health outcomes
- To analyze the socio-economic determinants of health outcomes and their impact on Infant Mortality Rate and Under Five Mortality Rate

To test the significance of rank correlation coefficients of different indices for different states, t statistic has been carried out to calculate the empirical t value using the formula

$$t = rR\sqrt{n-k} / \sqrt{1-r^2}$$

Where t distribution has n-k degrees of freedom.

Health an important aspect of life is influenced by different factors such as social, economic, demographic, environmental, cultural, biological and so on. These factors are interdependent and interconnected with each other and influencing one another and health as well. In analyzing health outcomes and its different determinants, multivariate analysis is most suitable one. In order to find out the socio-economic determinants of health outcomes and how do they affect the health and different socio economic, demographic, environmental, maternal health nutritional factors has been considered. By using Principal component and its factor loadings health outcomes index for 20 major states of India has been workout. These factors again consist of some indicators. For example, socioeconomic factors include literacy, per capita Net state Domestic Product (NSDP), per capita public expenditure on health, per capita private expenditure on health etc. For consideration of multiple indicators into one factor by assigning weights objectively, the robust method often used is Principal component Analysis (PCA). In this study, the indicators that obtained after carrying out PCA are index for Socio Economic status (ISES), index for Demographic status (IDS) and index for Environmental Status (IES), index for Maternal Health (IMH) Index for Malnutrition (IMAL) and Index of Child Health Immunization (ICHI).

In order to investigate the relationship between variables Regression Analysis has been used. In Linear regression model, the dependent variables, the health outcomes are assumed to a linear function of independent variables i.e. the prepared indices. In order to explain the impact of Index of Socio Economic Status (ISES), Index of Demographic Status (IDS), Index of Environmental Status (IES), Index of Maternal Health Care (IMHCS) and Index of Malnutrition Status (IMALS) on two important health outcomes related to child health namely IMR and U5MR, regression analysis will be used where IMR and U5MR will be dependent variables for two equations and Index of socio-economic factors will be independent variables. The regression equation takes the following form:

$$Y_i = b_1 + b_2X_{2i} + b_3X_{3i} + b_4X_{4i} + b_5X_{5i} + b_6X_{6i} + e_1$$

Where, (i = 1, 2, 3 …...20) and e_1 is the disturbance term.
X_2=Index of Socio -Economic Status (ISES)
X_3=Index of Demographic Status (IDS)
X_4= Index of environmental Status (IES)
X_5=Index of Maternal Health Care (IMHC)
X_6=Index of Malnutrition Status (IMAL)

Y_i = Infant Mortality Rate (IMR) and Under Five Mortality Rate (U5MR)

And, b_1, b_2, b_3, b_4, b_5, b_6 coefficients of regression to be estimated.

SOCIO-ECONOMIC DETERMINANTS OF HEALTH OUTCOMES AND THE RELATIONSHIP BETWEEN INFANT AND CHILD MORALITY AND SOCIOECONOMIC FACTORS OF HEALTH OUTCOMES:

The health status of a population is a reflection of the socio- economic development of the country and is shaped by a variety of factors such as the level of income and standard of living, housing, sanitation, water supply, education, employment, health consciousness, personal hygiene and by the coverage, availability, accessibility and affordability of health care delivery services(chatterjee2009) provision of public health care, sanitation, clean water and raising awareness about the causes of illness and their treatment are some of the ways in which the now industrialized countries view about levels of development. The relationship between infant and child mortality and socio- economic, demographic and maternal health care factors is given below.

SOCIO- ECONOMIC FACTORS

WHO acknowledges that the health status of an individual is influenced by social and economic circumstances, over which individual have a little control. Some important socio-economic factors such as maternal education, standard of living, place of residence have intense impact on infant and child mortality. Educated mother's consciousness, awareness and eagerness for the benefits of her children make the difference. Being a part of a particular social groups also influences people's health care seeking behavior. Place of residence in developing countries matter a lot in people's life style, their awareness and their social economic and cultural activities, which in turn affect their health outcomes.

MOTHER'S EDUCATION

A mother's education is considered to be one of the most important factors because it facilitates her integration into a society impacted by traditional customs, exposes her to information about better nutrition, use of contraceptives to space birth and knowledge about childhood illness and treatment. Education enhances a mother's abilities to make use of government and private health care resources and it may increase the autonomy necessary to advocate for her child in the household and the outside world. Mother's education is often just a good indicator of other socio- economic factors that affect under-five mortality directly. Children born to a mother with secondary or higher education have lowest rates for all types of childhood mortality. IMR and U5MR among children born to illiterate mother have been consistently higher than those born to mother with any education (Paul 2014). Mother education has an important role to play in utilizing antenatal care proper utilization of antenatal care benefits both mother and children and reduce their chances of mortality. It has been well knowledge that overall literacy ensures better use of health services with better child care and feeding practices. It also leads to more hygiene household practices and personal habits and raises the demand for community health services (Flegg1982).

Table1. Depicts the neonatal, postnatal, infant, child and under five mortality rates by the education level of the mother for the period 2001-05&2015-16 (NFHS-3&4). It is evident from the table that mother's education is associated with higher rates of child survival. As shown in the table, children born to mothers with 8-9 years of schooling have 30 percent lasses 'changes of dying in neonatal period and 60 percent lesser chances in the post- neonatal period, as compared to the illiterate mother. The IMR is 40 percent less for the children of mother with 8-9 years of schooling, per cent less for mothers with 10-11 years of schooling and 63 percent less among the children whose mother have completed 12 and more years of education as compared to illiterate mothers. Similarly, the under-five mortality rates are 69 percent lesser for the children whose mothers have more than 12 years of schooling as compared to children having illiterate mothers.

IMPACT OF IDS, IES, IMH, IML VARIABLES ON IMR AND U5MR: Principal component Analysis (PCA) has been utilized to prepare the composite indices. The factors that have been considered under socioeconomic status indicators depict the favourable condition of the society. So, high scores on the Index of socioeconomic Status (ISES) imply better socioeconomic status. Accordingly, the states have been ranked assigning rank one for highest scorer state and twenty for the lowest scorer state. However, the indicators considered under Demographic Status, such as percentage of women married by exact age of Eighteen years, percentage of women age 15-19 who have begun child bearing, percentage of women who wants more sons than daughters, percentage of children age 12-23 months who did not receive all basic vaccination and percentage of children age who received a prolateral feed during first three days of life, show unfavourable demographic profile of the society. Naturally, the high scorer states actually show undesirable demographic condition of the society. So, under Index of Demographic scorer state has ranked as first and rest of states have been ranked accordingly. Therefore, in this section, determinants of health outcomes and different socio-economic indicators of health for State wise have been examined. Scores and their corresponding ranks along with IMR and U5MR have been presented in table 2 Ranks are given within the parentheses of the corresponding values. While examining the relative performance of the states on the basis of these indices, it is found that the states like Goa, Delhi, Kerala and Tamil Nadu.

Table 2 explained the different indices of health outcomes such as IDS, IES, IMH, IML variables on IMR AND U5MR. Socio economic index shows that highest value of the district indicates the top position for both the point of time. It is also evident from the table that there has been a shift in the relative position of the states in terms of socio -economic health outcomes variables. The value of the index varies from 4.188 to -2.607 for the point of time. Socio economic Index showed the highest best performance state is Goa with 1st rank (4.188) index value and it is followed by Himachal Pradesh depicts 2.503 with (2and) rank. In the index of Demographic status, the high scorer states actually show undesirable demographic condition of the society. So, under Index of Demographic lower scorer state has ranked as first and rest of states have been ranked accordingly. In the table 2 the Index of Demographic shows that the lowest scorer performance state is Punjab given 1st rank with (-1.699) index value of Principle component. It is followed by the Kerala state with 2and rank (-1.369) index value. On the other hand, the state West Bengal

achieved (3.851) with the higher (20 th) rank. By using Principal component and its factor loadings Maternal health index for 20 major states of India has been workout and presented in Table 2depicts that highest value of the district indicates the top position for the point of time. It is also evident from the table that there has been a shift in the relative position of the states in terms of maternal health outcomes variables. The values of the index varies from4.033 to -4.411 for the point of time. Maternal Health Index showed the highest best performance state is Kerala with 1st rank (4.033) index value of Principle component of Maternal health outcome indicator. It is followed by the Goa state with 2and rank 4.032 index value. On the other hand, Maternal Health Index showed the worst performance state is Bihar with 20th rank with -4.411 index value of Principle component of Maternal health outcome indicator. It is followed by the Utter Pradesh state with 19th and rank 2.779 index value. The probable reason for the improvement in maternal health because of batter education and awareness.

Environmental Health Index showed the highest best performance state is Delhi with 1st rank 2.157 index value of Principle component of environmental health outcome indicator. It is followed by the Kerala state with 2and rank 1.968 index value. On the other hand, Maternal Health Index showed the worst performance state is Bihar with 20th rank with -3.530 index value of Principle component of Maternal health outcome indicator. It is followed by the Jharkhand state with 19th and rank -2.292 index value. Index of malnutritional consist of those conditions that portray the adverse condition of the state. Therefore, higher score actually speaks of the worst condition. Here, the lowest scorer state has been ranked one, whereas the highest scorer state has been ranked twenty rank. Malnutritional Health Index showed the highest best performance state is Delhi with 1st rank 2.157 index value of Principle component of environmental health outcome indicator. It is followed by the Kerala state with 2and rank 1.968 index value. On the other hand, Maternal Health Index showed the worst performance state is Bihar with 20th rank with -3.530 index value of Principle component of Maternal health outcome indicator. It is followed by the Jharkhand state with 19th and rank -2.292 index value. The states have also been ranked on the bases of IMR and U5MR values. States having the highest value of IMR and U5MR have been ranked as twenty rank and the states having the minimum values of IMR and U5MR have been ranked as first.

REGRESSION RESULT OF HEALTH OUTCOMES VARIABLES

In order to grasp the impact of IDS, IES, IMH, IML on IMR and U5MR, two regressions have been done. Table 3 cleared that the model 1 IMR is dependent variable and IDS, IES, IMH, IML are independent variable and In Model 2 U5MR dependent variable and IDS, IES, IMH, IML are independent variable. Demographic Regression value are (-.765) and U5MR value are this show the negative impact of IDS on U5MRfrom table 3. From the table the value of R^2 for Model 1 & 2 (Which are .652 & .545) are satisfactory. In Model 1, IDS and IES have not turned out to be significant of IMR. However, the composite indices namely IMH and IML are found to have significant influence on IMR. In Model 2 from estimated regression coefficients it can be inferred that index of maternal health care has significant effect on under five mortality.

Table 1. Early Childhood Mortality Rates Of Mother's Education Nfhs-3, 2005-06& Nfhs- 4 2015-16

Education	Neonatal Mortality		Postnatal mortality		Infant mortality		Child mortality		Under Five mortality	
	NFHS3	NFHS4	NFHS 3	NFHS4	NFHS3	NFHS4	NFHS3	NFHS4	NFHS3	NFHS4
No education	45.7	37.2	24.0	16.0	69.7	53.2	26.9	15.1	94.7	67.5
< 5 years complete	48.4	37.6	17.6	13.6	66.0	51.2	13.8	11.0	78.8	61.7
5-7 year complete	34.5	33.0	15.1	10.3	49.5	43.3	11.5	8.9	60.5	51.8
8-9 years complete	32.0	28.9	9.5	10.9	41.5	39.8	5.6	6.1	46.9	45.6
10-11 years complete	26.9	19.8	9.6	8.0	36.5	27.9	3.6	4.1	40.0	31.8
12 or more years complete	19.6	17.9	6.3	5.6	25.9	23.5	3.9	3.0	29.7	26.5

Source: National Family Health Survey -3&4, Ministry of Health and Family Welfare, Government of India.

Table 2. PCA values and ranking of the states based on different indices

States	INDEX OF SECIO-ECONOMIC	INDEX OF DEMOGHIC	INDEX OF MATERNAL HEALTH	INDEX OF ENVIRONMENTAL	INDEX OF MALNUTRIONAL	INFANT MORTALITY 2017	UN5MORTALITY RATE
Karnataka	0.987(7)	0.355(14)	0.188 (11)	0.585(8)	-0.369(8)	25(10)	28(9)
Tamil Nadu	1.843 (4)	-0.572 (8)	1.306 (5)	1.159 (5)	-1.595 (5)	16 (3)	19 (2)
West Bengal	0.635 (8)	3.851 (20)	-0.453 (13)	-0.499 (13)	0.594 (13)	24 (9)	26 (8)
Maharashtra	1.604 (6)	0.340 (13)	1.147 (6)	0.161 (12)	0.436 (11)	19 (5)	21 (4)
M.P.	-1.482 (17)	-0.519 (9)	-2.598 (17)	-1.219 (16)	2.640 (18)	47 (20)	55 (19)
Goa	4.188 (1)	-1.142 (5)	4.032 (2)	1.904 (3)	-3.526 (2)	9 (2)	-
Bihar	0.343 (12)	1.724 (19)	-4.411 (20)	-3.530 (20)	3.256 (19)	35 (16)	41 (14)
Andhra Pradesh	-0.44 (15)	1.327 (17)	1.866 (4)	1.041(7)	-0.309(9)	32(14)	35(12)
Haryana	0.504(10)	-0.261(10)	-0.664(15)	1.061(6)	0.882(14)	30(12)	35(13)
Rajasthan	-1.800(18)	1.439(18)	-1.723 (16)	-0.781(14)	1.242(15)	38(15)	43(15)
Orrisa	-0.272(16)	0.679 (15)	-0.496 (14)	-1.661(17)	0.332(10)	41(18)	47 (18)
Punjab	2.137(3)	-1.699(1)	2.040 (3)	1.551(4)	-2.069(4)	21(6)	24(6)
Gujarat	0.491(11)	0.085 (12)	0.225 (10)	0.571(9)	1.582(16)	30(13)	33(10)
Chhattisgarh	0.514(9)	-0.195(11)	-0.449 (12)	-0.803(15)	0.554(12)	38(17)	47(17)
Himachal Pradesh	2.503(2)	-1.256(4)	0.903(7)	0.547(10)	-1.562(6)	22(7)	25(7)
Utter Pradesh	-2.519 (19)	-1.029 (7)	-2.779(19)	-2.245(18)	1.816(17)	41(19)	46(16)
Jammu &Kashmir	0.249(13)	-1.130 (6)	0.364(8)	0.329(11)	-2.229(3)	23(8)	24(5)
Delhi	1.742(5)	-1.31(3)	0.225(9)	2.157(1)	1.122(7)	16(4)	21(3)
Jharkhand	-2.607(20)	0.770(16)	-2.756 (18)	-2.292(19)	4.241(20)	29(11)	34(11)
Kerala	-0.490(14)	-1.369 (2)	4.033(1)	1.968(2)	-4.795(1)	8 (1)	12(1)

Source: Data taken from National Family Health Survey-4, Ministry of Health and Family Welfare, GOI
Note: 1. Ranks values are given in Brackets ()". 2. IMR data 2019 Sample Register system, OFFICE OF THE REGISTRAR GENERAL, INDIA 3. U5MR data from National Family Health Survey-5, Ministry of Health and Family Welfare, GOI

Table 3. Regression Result Of Health Outcomes Variables Imr And U5mr Modal

Variables	Model 1 Dept Var. IMR	Model 1 Dept Var. U5MR
Intercept (dept. Var.)	63.660	65.952
IDS	-.577 (.078)	-.765 (.054)
IES	-.633 (.022)	-.755 (.022)
IMH	-.081 (.881)	-.070 (.914)
IML	1.073 (.261)	1.630 (.159)
R²	.652	.545
Adjusted R²	.686	.589

Value Reported in pantries are significance level

Again, IDS and IES are not significant determinant of under-five mortality. IML has not turned out to be a significant determinant of under-five mortality in this study. Conceptually socioeconomic, demographic and environmental factors should influence infant mortality rate and under-five mortality rate considerably. However, in these regression equations, none of them are found to be significantly influencing IMR and U5MR. This is because of existence of multicollinearity.

High R^2 along with insignificance regression coefficient regression coefficients and high value of variance inflation factor (VIF) confirm the problem of multicollinearity. Since all the socio economic, demographic, environmental variables are supposed to be closely related, the problem of multicollinearity is not very much unexpected. In order to find out the correlation of ranking of the states on the basis of these indices and IMR and U5MR, Spearman's coefficient of rank

Table :4 Health Outcomes Different Indices: Correlation Matrix

INDICES	ISES	IDS	IMH	IENS	IMAL	IMR	U5MR
ISES	1	.710** (0.000)	.118* (0.311)	.082* (0.366)	-.004* (0.4954)	-.169* (0.238)	-.190* (0.211)
IDS		1	-.046* (0.424)	-.169* (0.237)	.120* (0.308)	-.119* (0.309)	-.135* (0.286)
IMH			1	.766** (0.000)	-.915** (0.000)	-.710** (0.000)	-.732** (0.000)
IENS				1	-.719** (0.000)	-.771** (0.000)	-.768** (.000)
IMAL					1	.667** (0.000)	.691** (0.000)
IMR						1	.994** (0.000)
U5MR							1

Note: **correlation is significant at the 0.01 level (1-tailed) *correlation is significant at the 0.05 level (1-tailed)

Table 5. Test of Significance for Rank Correlations

Rank correlation between variables	Empirical t value	Significance Level	Null Hypothesis
ISES & IDS	-1.60	Significant at ten percent	Rejected
ISES & IES	2.65	Significant at five percent	Rejected
ISES & IMHC	2.087	Significant at five percent	Rejected
ISES & IMAL	-1.94	Significant at Ten percent	Rejected
IDS & IES	-2.30	Significant at five percent	Rejected
IDS &IMHC	-1.90	Significant at ten percent	Rejected
IDS & IMR	1.50	Significant at ten percent	Rejected
IDS &U5MR	1.02	Significant at ten percent	Rejected
IES &IMHC	7.55	Significant at one percent	Rejected
IES &IMAL	-1.95	Significant at ten percent	Rejected
IES & IMR	-4.70	Significant at one percent	Rejected
IES &U5MR	-4.14	Significant at one percent	Rejected
IMAL & IMR	4.26	Significant at one percent	Rejected
IMAL &U5MR	3.62	Significant at five percent	Rejected
IMR & U5MR	30.25	Significant at one percent	Rejected

correlation has been computed. These values are depicting in the table 4. We find that rank correlation between ISES and IMR is -0.169 and between ISES and U5MR is -0.190. Statistically highly significant correlation coefficient between ISES and U5MR corroborate the fact that there exists inverse relationship between ISES and IMR and U5MR. If socioeconomic status of the society improves, it will definitely have positive impact on the levels of IMR and U5MR.The rank correlation between IDS and IMR and IDS and U5MR are -0.119 and -0. 135 respectively. Statistically significant relationship shows the important improvement of demographic status to improve the child health.

The rank correlation between IES and IMR is -0.771, whereas it is -0.768 between IES and U5MR, which are in the expected direction and statistically significant. Betterment of environmental condition does have favorable impact on IMR and U5MR. IMH is also highly correlated with IMR and U5MR, their rank correlation being –0.710 and -0.732respectively. Statistically highly significant correlation coefficients between IMH and IMR and U5MR support the fact that lack of maternal health care precipitates chances of child mortality. The relationship between IMAL and IMR and IMAL and U5MR also echo the importance of nutrition in reducing infant and child mortality. Thus, from the table 5 it is quite clear that in every occasion null hypothesis is rejected and alternative hypothesis is accepted as the absolute value of empirical 't' value is always greater than the tabulated 't' value. Thus, it can easily be said that in each and every case strong correlation exists.

CONCLUSION

A large number of women die every year during childbirth and pregnancy in India. Access to maternal health care services in India remains far from universal. Unfortunately, India, emerging as a superpower, is losing its growth due to pathetic health record. More disturbing fact is that malnutrition of India is approximately double to sub Saharan African country with consequences for morbidity, mortality, productivity and economic growth (world bank 2005). India's maternal mortality rate at 178 per one- lakh live births is 50 time higher than the developed world. To tackle this enormous problem, a number of interventions have been provisioned for the current RCH pregame. They are provision of emergency obstetric care through establishment of first Referral Units, Promotion of institutional delivery by providing round the clock delivery services in PHCs. In current scenario the issue of child health and maternal health are gaining much importance around the world.

In order to deals with these issues, it is important to ensure proper quality of health services during pre- and post-delivery periods. Unlike corruption, inflation and health concerns have never been political charges issues in our country. It is reason that the first National Health policy, which an object to strengthen public health system, appeared at late as 1980s. However, with one of the economic reforms, the role of government in providing health care reduced continually till the 11th five-year plan with explicitly stated objective of inclusive growth which clearly envisaged an increase in public expenditure on health to at least 2 per cent of GDP.

The plan had recognized that while total expenditure on health in India as percentage of GDP was comprisable to that of other developing countries, there was disproportionate reliance on private medical services. It is call for substantial increase in financial and physical provisioning for health services.

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