IOSR Journal Of Humanities And Social Science (IOSR-JHSS)
Volume 20, Issue 8, Ver. I (Aug 2015), PP 11-16
e-ISSN: 2279-0837, p-ISSN: 2279-0845.
www.iosrjournals.org

Interstates Disparities in Infant Mortality Rates and Their Major Determinants in India: Study Based on Latest Census, 2011

Uttam Kumar Sikder* and Mithun Singha Roy**
**Assistant Professor (stage 3), Department of Economic and Polities, Visva-Bharati, Satiniketan*
***Research Scholar, Department of Economic and Polities, Visva-Bharati, Satiniketan*

Abstract: *This paper tried to examine the interstate disparities of infant mortality rate(IMR) and their major determinants in India where the study based on cross sectional data in latest cencus,2011.In the present study, twenty seven states out of thirty states in India has taken as a cross sectional units. The choice of states and socioeconomic as well as demographic variables are partly guided by availability of data. The IMR has been considered as most important indicators of health for the construction of human development index (UNDP, 1995) and it is taken as a proxy variable of the life expectancy at birth. In this paper we tried to capture interstate disparities of IMR by vertical bar diagram approach and next to explain the major determinants of IMR. We have run a robust multiple regression models by applying OLS technique. Before, running multiple regression the pair wide correlation coefficient between IMR and all explanatory variables separately as well as pair wide inter correlation among explanatory variables have been calculated. It is seen from bar diagram there is clear evidence of interstate disparities of IMR in India in 2011.The findings of correlation coefficient indicates that the nature and degree of association between paired variables to be satisfying the a priori theoretical expectation in every case. It is found from robust multiple regression model the female literacy rate, net state domestic product at factor cost at constant prices and constant term are statistically significant at varying level.*

Key Words: *Health, Infant mortality rate, Census, Socio-economic and Demographic variables.*

I. Introduction

While there is any hardly any denying proverb 'health is wealth', securing good health requires minimum level of wealth and income. Unfortunately, given a socio-economic characteristics of a developing country like India, there prevails a high degree of sleekness in wealth distribution and hence alarming inequalities in access to and spread of health service. The infant mortality rate (IMR) has been considered as a most important indicators of health for the constriction of human development index (HDI) by united nation development programme (UNDP, 1995) and it is taken as a proxy of life expectancy at birth. Therefore infant mortality reflects a country's level of socio-economic development and quality of life and used for monitoring and evaluating population, health program and polities. It is an outcome rather than cause and have directly measures results of the distribution and use of resources, Haines (1995).

There is a significant decline in infant mortality rate since last three decades which is evident from Indian census data.

The infant mortality rate declines from 77 per 1000 live births to 44 per 1000 live birth from 2001 to 2011 respectively which is not doubt impressive. But Indian performance with respect to other countries in Southeast Asia is not impressive. As children are important assets of nation, therefore reduction in infant mortality is likely to be most important objective of Millennium Development Good 4 (MDG 4, 2000). There of the eight MDG are health related, calling for a two-third reduction in a child mortality and three quarter reduction in maternal morality and to spread of HIV/AIDS, malaria and tuberculosis. Although the progress of the decline is impressive but till now India do not able to fulfill the objective of MDG 4. In 2011 census Indian infant mortality rate is 44 per 1000 live birth instated of 28 per 1000 live births by 2015 as per MDG 4.

Although there is an impressive decline in infant mortality rate in India but there exist statewide disparities of this health indicator. Using census data (2011), this paper attempts to study the existing interstate disparity in infant mortality rate of selected twenty seven states out of thirty states in India and its major socio-economic and demographic determinants. The choices of independent variables and states are partly guided by availability of data. The one of the prime objective of this study to see which variables, economics, social and demographic have greater impact in reducing infant mortality levels.

II. Objective Of This Article

In keeping with view of infant mortality rate as a most important determinant of 'health', the objective of the present study may be stated as below.

1. To examine the intestate disparities of infant mortality rates among twenty seven states out of thirty states in India.
2. To examine the factors which are responsible for the interstates variation of infant mortality rate in India as a whole?

III. Data, Methodology And Econometric Model

The entire data used in the present study is from secondary sources of data collected through census, 2011, International Institute of population science (IIPS) and ministry of health and family welfare, Integrated Child Development Services (ICDS) published by planning commission, on March 2011, office of the Registrar General, India Health and Family Welfare Statistics in India, 2013 and Directorate of Economics and Statistics of Respective state Government, Central statistical office.

The present study is based on the basic of cross section data in 2011 where twenty seven states out of thirty states in India are considered as a cross sectional units. These states are Kerala, Mizoram, Goa, Arunachal Pradesh, Jammu & Kashmir, Maharashtra, Tripura, Meghalaya, Sikkim, Tamil Nadu, West Bengal, Punjab, Karnataka, Gujarat, Himachal Pradesh, Andhra Pradesh, Bihar, Haryana, Assam, Rajasthan, Uttar Pradesh, Madhya Pradesh, Odisha, Nagaland, Chhattisgarh, Jharkhand and Uttarakhand. We droop there state due to non availability of data.

To explain the interstate disparities of infant mortality rate in India we have presented vertical bar diagrammatic approach and next to explain the determinants infant mortality rate at state level in India we shall use correlation and multiple regression (robust) analysis. The functional relationship (Multiple regression models) is described below.

IMR = f (ID, VC, SR, FLR, PSC, PST, UP, SP, NSDP, U)

Where

IMR: Infant mortality rate
ID: Percentage of institutional delivery of child
VC: Percentage of vaccination of the child
SR: Sex ratio
FLR: Percentage of female literacy rate
PSC: Percentage of scheduled cast population to total population
PST: Percentage of scheduled tribe population to total population
UP: Percentage of urban population to total population
SP: Percentage of slum population to total urban population
NSDP: Per capita net state domestic product at constant prices 2004-05
U: Disturbance term

To estimate the model we have applied ordinary least square method (OLS)

IV. Results And Discussion

Interstates disparities in infant mortality rate in India: A bar Diagram analysis of selected states in India in order to supplement the descriptive statistical frame work (Table 1) in Bar Diagram 1 in appendix with a more reviling picture at a glance a bar diagrammatic approach was followed by us. The bar diagram represents the disparities of the infant mortality rate for each selected twenty seven states in India in 2011.

It is seen from bar diagram that infant mortality is as high as 59 in Madhya Pradesh which is one of the tribal concentrated state in India in 2011 followed by the states Uttar Pradesh (57), Odisha (57), Haryana (55), Assam (52) and Nagaland (48). On the other hand the infant mortality rate is as low as 11 in Goa followed by Kerala (12), Nagaland (21), Tamil Nadu (22), Maharashtra (25), Tripura (29) and Punjab. It is also seen that at national level the infant mortality rate is 44 which mean 44 dies at 1000 live birth before the first birth day of life. The infant mortality rate in Haryana and Bihar (44) is same as national average followed by the states Andhra Pradesh, Gujarat (41) and Jharkhand. We found that for the infant mortality rate is above average level states of Meghalaya, Assam, Rajasthan, Uttar Pradesh, Madhya Pradesh, Odisha and Chhattisgarh and it is below national average for the rest of the states in our consideration. Actually infant mortality rate depends on various socio-economic and demographic factors. Access to health care facility varies from state to state as well as country to country. Highest infant mortality rate (59) in a tribe concentrated state in Madhya Pradesh is caused by very low access to health care service among the household in this state. Basically tribal populations are isolated from main stream population which affects their 'health' and health care facility. The lowest infant mortality rate in Goa is caused by more or loss high access to health care facility of the households in the state.

States wide disparities in infant mortality are obviously are caused by state-wide disparities in access to different health care facilities.

Profile of inter-correlation among socioeconomic and demographic variables

In the present subsection we shall try to examine the extent of correlation between the dependent variable namely, infant mortality rate and the chosen explanatory variables namely, percentage of institutional delivery of child, sex ratio, percentage of female literacy rate, percentage of scheduled cast population to total population, percentage of scheduled tribe population to total population ,percentage of urban population to total population and per capita net state domestic product at factor cost at constant prices (2004-05). Before running robust multiple regression model of infant mortality rate correlation analysis is also done among the explanatory variables to very whether muticollinearity exists among the explanatory variables which is presented triangular matrix in table 2 in appendixes. The findings indicate the nature and degree of association between paired variables to be satisfying the a priori theoretical expectation in every case, thus ruling out any severe chance of multicollinearity. However, in a few cases, where the correlation coefficient is slightly higher, the problem will overcome by adopting a step wide procedure in the regression estimation. It has help in converging to the most significant variables influencing infant mortality. It is seen that the pair correlation coefficients between IMR and ID, IMR and VC, IMR and FIR, IMR and UP, IMR and NSDP, ID and FLR, ID and UP, ID and NSDP, VC and FIR, SR and FLR, FLR and NSDP and PSC and PST are statistically significant at 5% level.

Results of the multiple regression (Robust) model of Infant mortality Rate

We have attempted step wide robust multiple regression model by experimenting with the explanatory variable adapted. Taking infant mortality rate as a dependent variable the best performing ordinary least square (OLS) was found to be that which included percentage of institutional delivery (ID), percentage of vaccination of children (VC), sex ratio (SR), percentage of female literacy ratio (FLR) and net state domestic product at factor cost at constant prices at 2004-05. In terms of multiple coefficient of determination (R-squared) the overall goodness-of-fit of the chosen model is quite satisfactory as it is observed to be 0.5972. Hence about 60% of the variations in infant mortality rate can be explained in terms of explanatory variables included in the model. The probability of observed F value also points to an overall high satisfactory performance of the multiple regressions. Further as the average variance inflation factor falls to 2.08, the model also suffers from very low degree of multicollinearity effect.

It is seen that most of the estimated coefficients have satisfied a priori theoretical expectation. It is found that infant mortality is inversely related to the percentage of institution delivery, percentage of vaccination coverage, percentage of female literacy rate and NSDP at constant prices. On the other hand infant mortality is directly related to sex ratio which is divergence from a priori theoretical hypothesis which might have been caused by gender discrimination against women in the country look like India. In our estimated model we seen that FLR (female literacy rate) and NSDP are statistically significant at 5% level of significance where as constant term is statistically significant at 10% level.

From the multiple regression model it is seen that there is a inverse relationship between IMR and VC which is explained by the fact that universal immunization programmed by the government may be successful at grass root level at a long time. Similarly the inverse relationship between IMR and institutional delivery indicates that institutional delivery reduces the IMR since this ID is sate relative to home delivery of infant. The positive relationship between IMR and SR is the indication of presence of gender discriminations in our Indian society.

It is found that there is a statistically significant inverse relationship between female literacy rate and IMR which is explained by the fact that education, specially the higher education is one of the most important social indicators which has significant influence on the treatment seeking behavior of households' member. The negative and significant degree of association between IMR and NSDP can be explained by the fact that NSDP of any state can reflect the overall economic scenario of the state as a while which many be the prime determinant of health expenses by the household members. Total expenses of health can positively relate to household's annual income. Hence increase in NSDP leads to a fall in infant mortality rate. However the constant was observed to be statistically significant being positive. This point to the fact that in spite of improvement in health care system and access to health care facilities at macro level, the existing arrangements and intervention are still short of requirement.

V. Conclusion And Policy Suggestions

Over the years, India has attained impressive achievements in child survival. A fast decline in infant mortality rate (IMR) of the country been observed in recent past. The IMR has dropped by an average rate of 4.56% per year over last five years. However in current pace, the country will miss the target to achieve the forth millennium development goal (MDG-4), which aims to reduce under-five mortality rate and IMR by two-third between 1990 and 2015. Currently, almost all countries of the South-East Asia Region have lower IMR than of India. Though sixty years ago, India and china had almost the same IMR, but current IMR in china is just one-forth of Indian's IMR. China has reduced its IMR by 75% as compared to that of 1990, while India could reduce it only by 53%. Within India, there exists a large variation in the current rates and percentage reduces in IMR. In India overall decline in child mortality was largely hindered by subdued progress in the area of neonatal deaths, especially within the first week of birth (Kanat, S., 2015).

Indian's MDG 4 target is to reduce IMR by two-thirds between 1990 and 2015, i.e. from 80 infant deaths per 1000 live birth in 1990 to 28 by 2015. Six state of India namely, Kerala, Maharashtra, Goa, Sikkim, Tamil Nadu and Nagaland have been achieved the target of Millennium Development Goal 4 in 2011. The India and its most of the states are far away from achieving the MDG-4 Goal. The infant mortality rate of the states like Meghalaya, Assam, Rajasthan, Uttar Pradesh, and Madhya Pradesh are very high. Active government intervention is needed to eradicate the high level of infant mortality both at national and state level.

Multiple regression results show that it is the socioeconomic as well as demographic variables that have a close association with infant mortality rate. The disparity of these socioeconomic and demographic variables leads to statewide variation of infant mortality rate. Although the government of India has various health policies for treatment of people in the nation but it has not been implemented properly both at national as well as state level. Hence policy implementation by the government is necessary and sufficient condition for "health for all".

Acknowledgements

*I am highly indebted to my father Bodhisattva Makhan Lal Sikder and my mother Srimati Labanya Prova Sikder for guiding me all walks of my life and giving me freedom and courage to myself.

References

[1]. Cencus,2011 Government of India
[2]. District Level Household and Facility Survey – 2 (DLHS-2) (2002-04), IIPS, Mumbai, India & Ministry of Health and Family Welfare.
[3]. District Level Household and Facility Survey – 3 (DLHS-3) (2007-08), IIPS, Mumbai, India and Ministry of Health and Family Welfare.
[4]. Gujrati, D.N. et al. (2013), Basic Econometrics, Fifth Edition, Me Graw Hill Education (Indian) Private Limited.
[5]. Lahiri, S., Hazra, A. & Singh, A. (2011), "Sex-Differential in Childhood Mortality in Punjab and Haryana – are they reality?" Journal of population studies, no. 43, pp. 71-98.
[6]. Millennium Development Goals 4(Updated May 2015), World Health Organization.
[7]. Mondal, Md. N.I. et al. (2009), "Factor Influencing Infant and Child Mortality : A Case study of Rajshahi District, Banladesh, J. Hum Ecol, Vol. 26, No. 1, pp. 31-39.
[8]. Shetty, A and Shetty, S. (2014), "The correlation of Infant Mortality Rate and Sex Ratio in Indian States", Innovative Journal of Medical and Health Science, Vol. 4, No. 2, pp. 98-102.
[9]. Sikder, U.K. and Choudhury, B. (2015), "Growth and Determinant of Post Delivery Complication of Women in Respect of Access to Health Care Facilities in West Bengal: An Inter-District Analysis", American International Journal of Research in Humanities, Arts and Social Sciences, Vol.10 No. 2, pp. 131-139
[10]. Sikder, U.K. and Choudhury, B. (2015), "Growth and Determinants of Post Delivery Complication of Women in Respect of Access to Health care Facilities in West Bengal : An inter District Analysis", American International Journal of Research in Humanities, Arts and Social Science, Vol. 10, No. 2, pp. 131-139.
[11]. The Millennium Development Goal Reports 2010, United Nation, New York
[12]. Tripathy, P.K. and Sarangi, P.K., (2004), "Proximate Determinant of Infant Mortality in India", Journal of Family Welfare, Vol. 50, No. 2.

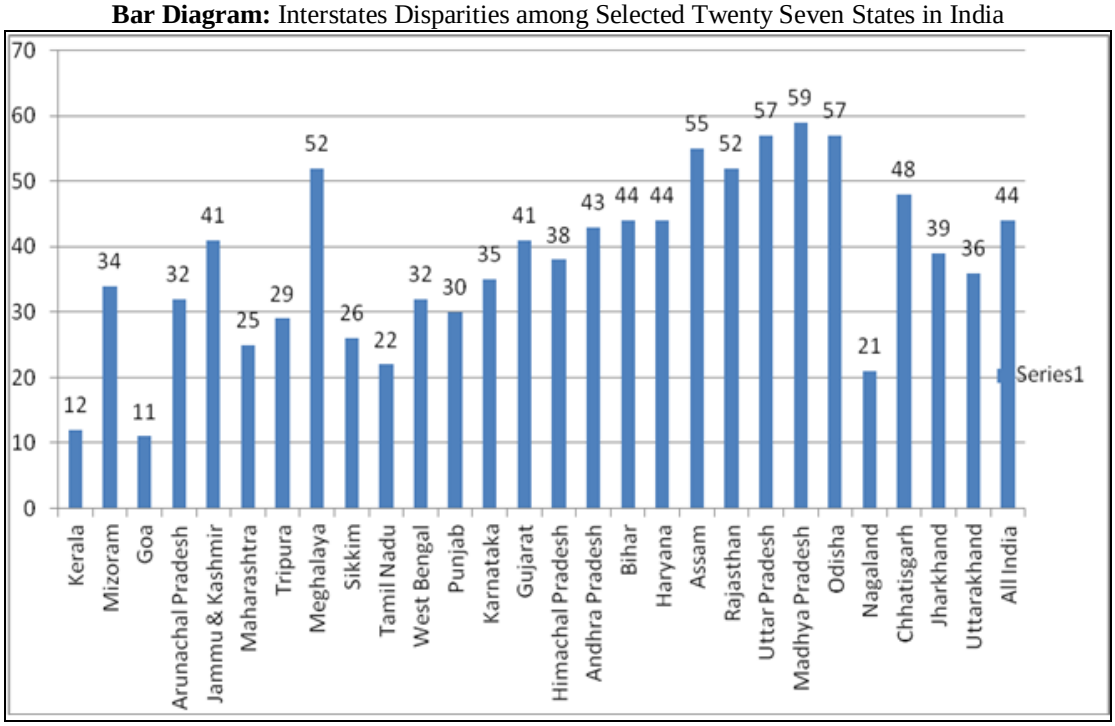
Appendix

Table 1: State Wide Distribution of Infant Mortality Rate in India in 2011

States/India	IMR
Kerala	12
Mizoram	34
Goa	11
Arunachal Pradesh	32
Jammu & Kashmir	41
Maharashtra	25
Tripura	29
Meghalaya	52
Sikkim	26
Tamil Nadu	22
West Bengal	32
Punjab	30
Karnataka	35
Gujarat	41
Himachal Pradesh	38
Andhra Pradesh	43
Bihar	44
Haryana	44
Assam	55
Rajasthan	52
Uttar Pradesh	57
Madhya Pradesh	59
Odisha	57
Nagaland	21
Chhatisgarh	48
Jharkhand	39
Uttarakhand	36
All India	44

Source: Census of India, 2011

Bar Diagram: Interstates Disparities among Selected Twenty Seven States in India



Source: Census of India, 2011

Table 2: Pair Wide Correlation Between IMR & All Selected explanatory Variables and Among All Explanatory Variables

. pwcorr imr id vc sr flr psc pst up sp nsdp,star(5)

	imr	id	vc	sr	flr	psc	pst
imr	1.0000						
id	-0.5971*	1.0000					
vc	-0.4841*	0.3805	1.0000				
sr	-0.2439	0.3781	0.1561	1.0000			
flr	-0.6836*	0.5635*	0.6452*	0.4543*	1.0000		
psc	0.2112	-0.0476	-0.0739	-0.0853	-0.2450	1.0000	
pst	0.0106	-0.3062	0.1151	0.0746	0.2196	-0.6803*	1.0000
up	-0.6533*	0.7941*	0.3248	0.2267	0.5515*	-0.2008	-0.0637
sp	0.2950	-0.1470	0.1180	-0.1067	-0.2883	0.2826	-0.0850
nsdp	-0.6313*	0.6495*	0.3273	0.0543	0.4804*	-0.1908	-0.1909

	up	sp	nsdp
up	1.0000		
sp	-0.0760	1.0000	
nsdp	0.6890*	-0.1727	1.0000

Source: Authors' Own Calculation from strata - 11.1

Table 3: Determinent of IMR : Multiple Regression Model

. reg imr id vc sr flr nsdp,robust

Linear regression

Number of obs	= 27
F(5, 21)	= 11.34
Prob > F	= 0.0000
R-squared	= 0.5972
Root MSE	= 9.3567

imr	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
id	-.0730119	.1296601	-0.56	0.579	-.3426548	.196631
vc	-.0371899	.1455	-0.26	0.801	-.3397738	.2653939
sr	.0090338	.046591	0.19	0.848	-.0878575	.1059251
flr	-.5592573	.2608222	-2.14	0.044	-1.101667	-.0168479
nsdp	-.0001435	.000065	-2.21	0.039	-.0002787	-8.32e-06
_cons	81.78536	41.0167	1.99	0.059	-3.51353	167.0842

. vif

Variable	VIF	1/VIF
flr	2.70	0.370537
id	2.28	0.438212
nsdp	2.05	0.487268
vc	1.80	0.555581
sr	1.55	0.643624
Mean VIF	2.08	

Source: Authors'' Own Calculation from Strata – 11.1