

The Effectiveness of Government Healthcare Expenditure in Reducing Infant Mortality: A Study of Barak Valley in India

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Abstract- Human life in its early stage is very vulnerable to the surrounding environment and susceptible to infections and diseases. It is thus imperative to protect the infants against morbidity and mortality. One way to overcome the health related uncertainties is to immunize the infant through vaccination against known and preventable diseases. In India, the immunization of children against six serious but preventable diseases namely tuberculosis, diphtheria, pertussis, poliomyelitis and measles is the main component of the child survival programme. Government, through its public healthcare provisioning, provides coverage to child vaccination. This paper probes to find the answer whether the public healthcare expenditure has been effective in reducing infant deaths in the area of study that is Southern part of the state of Assam popularly known as Barak Valley. The study uses data from the Block Primary Health Centres (BPHCs) of the three districts in the area of study. The data relates to infant vaccinations namely BCG, DPT, MMR and Polio vaccination and other variables that may affect infant mortality. Also, per capita healthcare expenditure in the area of study is derived, which is then subsequently used for analysis. A regression analysis is done to find the relationship between infant deaths and per capita public healthcare expenditure, along with other control variables.

Keywords – India, Infant Health, Infant Mortality, Immunization, Vaccination, Public Healthcare Expenditure

I. INTRODUCTION

Health care is generally defined to include those facilities and services which maintain and improve health. This comprises of a complex array of factors that determine health. Like the concept of health, health care is also not intrinsically valuable; it is ethically valuable because it contributes to health. Thus a justified distribution of access to and utilization of health care shall generate the desired level of health and productivity of the population.

According to World Bank (1991), other amenities like better nutrition, housing, hygiene and sanitation along with proper control of communicable diseases have raised the quality of life everywhere. Also it was advocated that benefits of good health flow through generations as mother's health influences her child's health. The study conducted by WHO (1981) has shown that vicious circle of poverty, malnutrition, disease reduces the productive capacity of the people. According to Rao (2006), there is a need for active role of the government to promote health care services as well as improve the health status to achieve the goal, HFA 2000. Investment in different dimensions of the social sector like education, health and skill of people enable them to participate in the growth process as well as to share its benefits, principally through remunerative employment. Banarjee, Deaton and Duflo (2004) studied the impact of health care delivery on the health status of the poor. It was found that the quality of public services is extremely low and unqualified private providers form the majority share of health care provisioning. The low qualities of public healthcare facilities have also an adverse impact on the people's health. According to them the state should take the responsibility for providing and regulating the health services. Bhatt (2005) examined the effects of various healthcare

financing, regulatory and organizational designs on the efficiency of healthcare delivery system. 24 OECD countries were examined and their efficiency estimated assuming CRS. Under CRS it is assumed that output increases or decreases by the same proportion as inputs.

In India, the immunization of children against six serious but preventable diseases namely tuberculosis, diphtheria, pertussis, poliomyelitis and measles is the main component of the child survival programme. As part of the National Health Policy, the National Immunization Programme is being implemented on a priority basis. The Government of India initiated the Expanded Programme on Immunization (EPI) in 1978 with the objective of reducing morbidity, mortality and disabilities among children from six diseases. The Universal Immunization Programme (UIP) was introduced in 1985-86 with the objective of covering at least 85 percent of all infants against the six vaccine preventable diseases by 1990. This scheme has been introduced in every district of the country. The standard immunization schedule developed for the child immunization programme specifies the age at which each vaccine should be administered and the number of doses to be given. Routine vaccinations received by infants and children are usually recorded on a vaccination card that is issued for the child. Immunization of children is completed by the age of 23 months, according to WHO guidelines.

According to DLHS-2(2002-04), only 17 percent of the children are fully vaccinated, and around 23 percent have not received any routine vaccination. Coverage of each vaccination is much higher than the percentage fully vaccinated. BCG, the first and second dose of DPT and first dose of Polio vaccine has been given each to more than half of children. About 39 percent of the children have received three doses of DPT, 29 percent of the children received 3 drops of Polio and 36 percent of the children have been vaccinated against measles. Moreover, not all children who begin the DPT and polio vaccination series go on to complete them. The differences between the percentage of children receiving the first and third doses is 25 percent point for DPT and 30 percent points for polio

Male children (18 percent) are more likely than female children (16 percent) to be fully vaccinated. Similarly, male children are also more likely than female children to have received each of the individual vaccinations. The vaccination coverage decreases with increasing birth orders. A large majority of first-order births occur to younger women who are more likely than older women to utilize child health care services. As with the use of child health care services, there is a positive relationship between mother's education and children's vaccination coverage.

The healthy being of the mother and the child is the prerequisite for the development of any society. The fourth goal of the Millennium Development Goal of the United Nations envisages the reduction of under-five mortality rate by two-third between 1990 and 2015(Target 4A) and the fifth goal sets to reduce maternal mortality ratio by three-quarters (Target 5A) as well as to create accessibility to reproductive health for all (Target5B)

According to the Mission Document of NRHM, public health expenditure in India had declined from 1.3 per cent of GDP in 1990 to 0.9 per cent in 1999. Vertical health and family welfare programs had limited synergy at operational levels. There was a lack of community participation affecting the effectiveness and efficiency of programs. High regional inequalities in the availability as well as lack of accessibility to economical health facilities were a few reasons behind the govt. decision to launch NRHM in 2005. Since then, govt. involvement as well as public expenditure in health sector has witnessed a significant change. How effective has been the implementation of this mission and how significant has been its presence on the health outcomes especially in case of infant health, is the major look-out of this study.

Assam is divided into 33 administrative geographical units called districts. Barak Valley comprises of three of these districts. The Barak Valley, located in the southern region of Assam, is named after the Barak River. It consists of three districts of Cachar, Karimganj and Hailakandi. The total geographical area of the Valley is 6922 sq. km. This constitutes 8.9 percent of the total geographical area of Assam. The region is surrounded by Manipur in the East, Tripura and Bangladesh in the west, Mizoram in the south and North -Cachar Hills and Meghalaya in the North. A comparative study of the annual average growth rate of population for different decades was done for Barak Valley in comparison to Brahmaputra valley, Assam and India (Bhattacharjee P R, Nayak P). The data revealed that during the last five decades, Barak valley witnessed fluctuating growth rate of population.

The average literacy rate of Barak Valley (78.45 per cent) is higher than the state average as well as that of the national average. Although the female literacy is lagging behind the male literacy rate, the urban literacy rate is far better than the rural. Female literacy is the lowest in the Hailakandi district of the valley but still it shows a better picture compared to the state female literacy level as well as the national figure. Female literacy plays a very important role in the improvement of maternal and child health, because it plays a vital role in the generation of awareness in mothers regarding their own health, their child's health and the importance of vaccinations and the knowledge about and benefits of prevailing government health related schemes and availing them.

The economy of Barak valley is agrarian based and financially weak with a majority of rural population.

II. OBJECTIVE

The objective of the paper is to find out whether the public healthcare expenditure has been effective in reducing infant deaths in the area of study that is Barak Valley. Infant mortality has a negative relationship with vaccination and immunization. Government, through its public healthcare provisioning, provides a significant coverage to child vaccination. Using those data, the paper tries to probe into the relationship between healthcare expenditure, healthcare provisioning and its impact on infant mortality.

III. METHODOLOGY

The study uses data related to infant vaccinations namely BCG, DPT, MMR and Polio vaccination, from the Block Primary Health Centres (BPHCs) of the area of study. The three districts which fall under the area of study are further divided into Block Primary Health Centres (BPHCs) for the disbursement of medical services in the rural areas. Each BPHC caters to a number of villages that fall under its purview. The Accredited Social Health Activists (ASHA) are the community health workers appointed under NRHM and working under the BPHCs. They undertake door-to-door survey of would-be and new mothers and infants and provide services and counseling related to pregnancy, child birth, post-partum care and infant care. Also they provide vaccination services. Thus all vaccinations done in an area is properly documented. These data are accessed through HMIS portal of the government. The study also required data related to per capita healthcare expenditure. This has been obtained from the accounts departments of the regional and local NRHM offices. The relevant data for the past five years are taken. Subsequently, a regression analysis is done to find the relationship between infant deaths and per capita public healthcare expenditure, along with other control variables.

IV. RESULTS AND DISCUSSION

In order to examine infant mortality status, the relation between Public expenditure and percentage of Infant death has been examined by using the following regression model:

$$Inf_{it} = \alpha + \partial_i P_{cex_{it}} + \pi_{it} N' + u_{it} \text{-----(1)}$$

Where Inf_{it} indicates percentage of infant deaths in i^{th} block Barak valley region of Assam and t stands for time period. $P_{cex_{it}}$ stands for the per capita public expenditure for i^{th} block in that period and N' indicates vector of other

variables supposed to influence maternal safe delivery of child. A negative value of ∂_i (coefficient of $P_{cex_{it}}$) would provide evidence for encouraging impact of public expenditure on child health. On the basis of the review of literature in Chapter-2 some other control variables affecting Infant deaths have been identified.

The final specification of the model is,

$$Inf_{it} = \alpha + \partial_i P_{cex_{it}} + \pi_1 Bcg_{it} + \pi_2 Mmr_{it} + \pi_3 Pnc_{it} + \pi_4 Cipd_{it} + \pi_5 Tt + \pi_6 Drd_{it} + u_{it} \text{---(2)}$$

Where,

Bcg=>percentage of BCG vaccinated infants to total number of live births in that year. A negative and significant value of the coefficient indicates impact on number of infant death.

Mmr => Maternal mortality rate i.e number of deaths of expected mother per 100000 live births. The relation with dependent variable is expected to be positive as higher deaths of mother lead to higher infant deaths..

Pnc => Post natal care complications attended by the health delivery system. Trained management of PNC crisis reduces the risk of death of the mother and infant after child birth. As such negative and significant value of the coefficient will lower number of infant deaths.

Cipd=> Child admitted in indoor patients departments for serious complications indicates deterioration of health conditions. The relation with dependent variable is expected to be positive.

Tt=> TT injection administered to mother builds immunity against tetanus infection. This is another major cause of maternal and child death due to sepsis and infection. The relation with dependent variable is expected to be negative.

Drd=> Diarrhea and Dehydration in children aged 0-5 yrs to total childhood diseases (0-5 yrs). A higher percentage of Diarrhea and Dehydration lead to more chances of infant deaths. The relation with dependent variable is expected to be positive.

The data used for the variables covers the period 2011-12 to 2015-16 on the basis of the availability of time series data for all the variables. u_{it} is disturbance term and assumed to be independently and identically distributed. The most important issue in estimation is the choice between pooled OLS method and a method that allows for state-specific effects. Therefore, we have applied the Redundant Fixed Effect (RFE) test to choose between the pooled OLS and fixed-effect methods. Rejection of pooled OLS method indicates that marginal effect of maternal health delivery system is not uniform across all the block in the Barak Valley region of Assam. Results are reported in Table 1.

Table 1 : Results of Fixed Effect GLS Regression¹

Coefficients	Value of Coefficients	t-statistic
Constant	0.99	2.36***
Pcex	-0.0001	-0.100
Bcg	-0.0006	1.74*
Mmr	0.005	1.68*
sPnc	-0.06	-2.08**
Cipd	0.02	2.56****
Tt	-0.001	-2.65***
Drd	0.004	1.92**
= 0.78	RFE= 14.40***	F- ststs= 14.63***

Note: (*) (**) and (***) indicate significant at 10%, 5% and 1% level.

*Cross-section SUR (PCSE) standard errors & covariance (d.f. corrected)

⁺Greater than lower and upper Durbin-Watson theoretical values at 5% level of significance

All the cross-section fixed effects are non-zero; as such presence of fixed effect is confirmed. However to confirm suitability of fixed effect model, we perform Redundant Fixed Effects Tests, the result of which is reported in Table 1.

The superiority of fixed effects model over the constant coefficients (pooled OLS) model is reinforced by the highly significant F-statistic. Also the computed value of Durbin-Watson test statistic in constant coefficient model indicates presence of positive autocorrelation when compared with theoretical value. The redundant fixed effects test shows whether fixed effects are necessary or not. Here, the null hypothesis is that the constant term is the same for all blocks in the Barak valley, and the alternative hypothesis is that constant term for each state is different (presence of fixed effects). As the estimated test statistics 14.50 is significant at the 1% level we reject the null hypothesis. Hausman test has also been performed to confirm the suitability of fixed effect model. The coefficients of all the explanatory variables (except Pcex) is found to be statistically significant and as per the expected relations. Thus number of infant deaths has been influenced by BCG vaccines, TT injections, maternal mortality, post natal care, critical illness of child leading to indoor hospital admissions, and higher incidences of Diarrhea and Dehydration. The negative value of coefficient of per capita public health expenditure implies positive impact of health expenditure but the value is not found to be statistically significant. This may be due to variation in allocation of expenditure in different heads of public health comprising ante natal and post natal components.

V. CONCLUSION

Child health is very much related to maternal health as a healthy mother produces a healthy baby. The global goal has been to reduce mortality and morbidity among mothers, infants and pre-school children. Review of literature shows that no healthcare system has achieved level of spending sufficient to meet all its client needs for healthcare. This is because resources are scarce and wants are unlimited. Thus economics of health lies in understanding the cost, capital and recurring expenditure and depreciation involved. Health expenditure is something which is showing

¹Cross-section SUR (PCSE) standard errors & covariance (d.f. corrected)

a worldwide rising trend over the years. Health expenditure is a significant policy issue in many countries, including ours.

Through the study, it has been proved that the number of infant deaths has been influenced by BCG vaccines, TT injections, maternal mortality, post natal care, critical illness of child leading to indoor hospital admissions, and higher incidences of Diarrhea and Dehydration. A marginal positive role has been noticed to be played by per capita healthcare expenditure in this regard. Though the value has it been found to be statistically significant, it could be due to various leakages between healthcare expenditure and healthcare provisioning. If such leakages can be prevented, and proper utilisation of government fund is done for the betterment of the said parameters, it shall show a positive impact on infant mortality and thus reduce it.

Thus, it can be said that it's too early to remove the support system provided to infant health in form of healthcare provisioning by the government. This in turn calls for a continuous public healthcare expenditure, in India, and so also in similar developing nations.

REFERENCES

- (1) Banerjee, Abhijit, Anjus Deaton and Esther Duflo (2004), *Health Care Delivery in Rural Rajasthan*, Economic and Political Weekly, February 24, 944-949
- (2) Bhatt. Ramesh, Nishant Jain (2006), *Analysis of Public and Privat Health Care Expenditures*, Economic and Political Weekly, January 7.
- (3) Bhattacharjee P.R, Nayak Purusottam, *Socio-Economic Rationale of a Regional Development Council for the Barak Valley of Assam*, Journal of NEICSSR, Vol27 (1), pp.13-26, 2003
- (4) Govt. of India, DLHS-II and III Reports, 2002-04, 2007-08, retrieved online from www.rchiips.org.
- (5) Govt. of India, NRHM Mission Document, 2005, retrieved online from www.nhm.gov.in
- (6) Govt. of India, HMIS Reports, 2011-12 to 2016-17, accessed online from www.nrhm-mis.nic.in
- (7) Rao, T.V (2006), *Human Resources Development Experiences Interventions Strategies*, Sage Publications.
- (8) *World Bank (1991), World Development Report*, Oxford University Press, accessed from <http://www.worldbank.org/>.