The Impact of Maternal Health Care Utilization on Probability of Child Survival in India

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Abstract

Maternal and child health programmes plays a key role in reducing infant and child mortality in any population. The Government of India started maternal and child health care services in the first five year plan (1951-56). This study uses data from the fourth round of the National Family Health Survey (NFHS, 2015-16). We are interested to examine the effect of child delivery at a healthcare facility, on child survival. We are followed by Mosley and Chen's framework (1884), according to the framework, several socioeconomic determinants are grouped into some categories, namely, maternal, environmental contamination, nutrient deficiency, and personal illness control. Consequently, we reduced the number of independent variables to women's age at birth and education, birth order, low child birth weight, household wealth, and healthcare. As a result, we used the reduced set of independent variables which is similar to previous studies on child survival in the region and international comparative studies. We are interested in estimating effect of child delivery at a healthcare facility, on the outcome, probability of child mortality. Since both treatment and outcome variable in our case are binomial, thus for analysis purpose we use a simultaneous equation bivariate-probit. This study seeks to investigate the influence of maternal health care programmes on child survival in India. The different childhood mortality measures very substantially from one state to another. Results of the paper also quantified the positive effect of such treatment toward child survival.

1. Background:

Maternal and child health programmes plays a key role in reducing infant and child mortality in any population. The Government of India started maternal and child health care services in the first five year plan (1951-56). The integration of family planning services with

maternal and child health services and nutrition services was introduced as a part of the Minimum Needs Programme during the fifth five year plan (1974-79). The primary objective was to provide basic public health services to vulnerable group of the pregnant women lactating mothers and pre-school children (Kantikar, 1979). Since then the promotion of health of mothers and children has been one of the most important aspect of the family welfare programme in India and has now been further strengthen by introducing the Child survival and safe motherhood programme (Ministry of Health and Family Welfare, 1992a).In 1996, safe motherhood and child health services were incorporated in to the Reproductive and Child Health (RCH) Programme by govt. of India. (Ministry of Health and Family Welfare, 1997, 1998). The NFHS report reveals that a sizeable proportion of women were there, who did not receive any health care. Mothers who had not sought any health care were asked about the main reason for not going for health care utilization. Among this group a proportion of women stated that it was not necessary to go for health care services. It is therefore necessary to ensure that all pregnant women and their children receive adequate maternal and child care programmes.

The available studies can be divided into two broader groups. The first group explored determinants of child mortality. The second group explored determinants of maternal healthcare utilization. India, a low-income transitional country in Asia. To check the direct effect of delivery in healthcare facility on probability of child mortality. The robust evaluation of program effect on population usually involves surveys, in many cases, including evaluation of maternal healthcare, conducting a survey is not possible due to lack of money, and time required to conduct a countrywide survey. To overcome these difficulties, we assess the effect of healthcare and homecare on child survival by using quasi-experimental evaluation of nonrandomized data from a cross-sectional survey.

Maternal and child health programmes are critically important in a country like India, which is experiencing very high infant and child mortality and maternal mortality. According to National Family Health Survey reports, child mortality in India was 109 in NFHS-1; 95 in NFHS-2; 74 in NFHS-3 and in NFHS-4 it is 50 per 1000 live births. The percentage of births to ever-married women that were delivered in health facilities increased steadily from 25 percent in NFHS-1 to around 79 percent in NFHS-4. Hence main objective of this study is to examine the effect of the maternal health care programmes on child survival in India.

2. Data Source and Methodology:

. This study uses Kids dataset from the fourth round of the National Family Health Survey (NFHS, 2015-16). The NFHS is a cross-sectional survey of 699,686 women aged 15 to 49 from 628,900 households. The final sample for analysis consisted of 2, 45,866 individuals out of this around 11,237 deaths have been taken place. We are interested in estimating effect of treatment, having child delivery at a healthcare facility, on the outcome, probability of child mortality. The NFHS gathered information on demographics, educational level, household wealth, health care utilization, and child mortality. However, sample is further reduced since the questions about place of delivery asked only about the most recent birth delivered during the last 5 years before the date of the survey.

2.1. Method: We are followed by Mosley and Chen's framework for study in the determinants of child survival. According to the framework, socioeconomic determinants at individual (e.g., women's education), household (e.g., household income), and community (e.g., healthcare input) levels affect a total of 14 proximate determinants of mortality which are grouped into several categories, namely, maternal factors, environmental contamination, nutrient deficiency, and personal illness control. Consequently, we reduced the number of independent variables to women's age at birth and education, birth order, child's birth weight, household wealth, and healthcare.

Bi-probit model: Since both treatment and outcome variable in our case are binomial, we use a simultaneous equation bivariate-probit. Logit and probit model do not take into account the endogeneity problem. When there are one or more binary endogenous regressor in a binary response model, we can apply Bi-probit model. This model follows the same mechanism as in IV model. The model consists of two equations. In the first equation, a dummy treatment variable is regressed on all control variables and one or more instruments. In the main equation, a dummy outcome variable is regressed on all control variables and the value of the treatment variable estimated in the first stage. Importantly, the instruments are excluded from the main equation. It also consider a latent variable model and we assume that the errors have a bivariate normal distribution with a variance normalized to unity and a correlation coefficient denoted as ρ. Unlike others model we cannot estimate the impact of the treatment simply by the coefficients as they are of latent variables. We estimate the effect in terms of marginal effect. This statistical specification is estimated using bi-probit command in Stata software package.

2.2. Description of variables: The outcome variable of this study is child mortality, defined as probability of dying during 0-59 months. Children known to have died between 0-59 months are regarded as the cases. This variable is binomial; it takes the value of 1 if the child dies between 0-59 months and takes the value of 0 if otherwise. There are two endogenous instrumented variables of interests which denote treatment and serve to gauge healthcare input. The instrumented treatment variable is "delivery in a healthcare facility" that takes the value of 1 if the child was delivered in a healthcare facility and takes the value of 0 if otherwise. The healthcare facility is defined as a government or private hospital, maternity home, and primary healthcare posts**.**

Instrumental Variables: There are two instrumental variables—"women from wealthier households" and "child with third and above birth order." The exogenous variables used to explain child mortality are taken from the previous studies. We have two dummy variables representing women's age: variable "age 20" indicates women aged 20 or younger at the time of delivery, while variable "age 36" indicates women aged 36 and older at the time of delivery. Dummy variable "low birth-weight" indicates if a child's birth-weight was 2500 grams or lower and "High birth-weight" indicates if a child's birth-weight is 2500 grams or higher. Dummy variable "higher education" indicates women with bachelor education or higher. Previous studies reported that having delivery at age 35 is associated with higher probability of child mortality.

3. Results: Table 1 shows the percentage distribution of children's survival and mortality status with their background characteristics. The prevalence of child survival (meaning thereby that they survived up to 60 month and above) is lowest among women with more than 36 Years, i.e. 94.28%, while it is highest i.e., around 96 % among women of 21-35 years age group. Those mothers whose educational status is up to secondary level, the prevalence of the children mortality is around 5%, while it is around 2 % of women with higher educational level. The prevalence of child mortality is high among poorer women i.e., (5%) while among the wealthier women it is 2.6%. Children are more prone to survive (i.e. 96%) of those women who has gone for the institutional delivery than the women who have not gone (94%). Children whose birth order is third & above among them child mortality is highest, i.e., 5.5%.

In Table 2, the negative effect of delivery in a health care facility on child mortality is an indicator of the violation of endogeneity assumption. To consider the delivery in a health care facility as an endogenous variable I applied Bi-probit model which takes care of the binary

endogenous variable in case of binary response variable method. The correlation between the error terms captures the likelihood of having probability of child mortality. A negative correlation indicates that the individual who have gone for the delivery in any health care facility are less likely to get the result of child mortality. From the estimated correlation coefficient we can say about the negative effect of the delivery in a health care facility on probability of child mortality.

Estimated Marginal Effect in Table 3 suggests that delivering in a health care facility improves the chances of child survival for women who actually participated in the program by about 0.3%.

4. Conclusion: This study seeks to investigate the influence of the maternal health care utilization in terms of the delivery in any health care facility on child survival in India. The different maternal health care facility services measures very substantially from one state to another. There is significant difference among states in delivery in healthcare facility, i.e. Institutional delivery.

The empirical evidence presented in this paper allows for drawing several conclusions. First, delivering children in healthcare facilities decreases the probability of mortality. We also quantified the positive effect of such treatment toward child survival. For women who delivered at health care facilities the probability of child mortality decreases by approximately **0.3%**. Findings suggest that utilization of maternal services in transitional countries should be encouraged and promoted in spite of the limitations and deficiencies in the current maternal healthcare system.

Second, this study demonstrates that the wealth gradient is an important barrier for utilization and hence influences the child outcomes. As a result, the wealthier use healthcare facilities which the poorer cannot afford. Generally we see that wealthier deliver in healthcare facilities, while the poorer have to deliver outside of healthcare facilities. In this context, one of the promising ways to reduce effect of wealth gradient to utilization is to introduce the benefits for pregnant women which could be linked to receivers of targeted social assistance programs. Third, our study demonstrates that the risk of delivering at a healthcare facility increased for higher educated women. Women with higher education are strongly associated with delivering in medical settings and hence with higher chances of child survival and lower level of child mortality. While, the risk of delivering at a healthcare facility increased with age group of women. Effectiveness of communication campaigns designed to explain the benefits

of maternal healthcare and encourage healthcare utilization is well documented in developing countries. In addition, intensive communication campaigns aimed at encouraging healthcare utilization slowly but steadily became appreciated in some transitional countries. This positive experience should be shared across the region.

The above finding underlies the importance of developing a strong information, education and communication programme with respect to maternal health care services and child survival. The cause of high rate of child mortality are linked to untimely pregnancies, low birth-weight, unsafe delivery and high fertility. These are the major causes for maternal mortality too. Hence promoting maternal and child health programmes and family planning together will accelerate the reduction of both mortality and fertility.

Finally, the population based nationally representative surveys became an important tool for measuring policy effect on health outcomes in many transitional and developing countries. Most of these surveys include modules on healthcare utilization and childbirth outcome. Having high-quality micro data to conduct evaluation of healthcare programs is an effective way to save time, effort, and costs while providing nationally representative results.

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Table 1: Percentage distribution of the children's mortality status with their background characteristics. (NFHS-4, 2015-16)

	Survivors	Dead	N
Age			
<20 years	94.78	5.22	43,334
21-35 years	96.02	3.98	172,149
>36 years	94.28	5.72	30,383
Educational Status of Women			
Upto secondary	95.33	4.67	220,899
Higher	97.85	2.15	24,967
Place of Delivery			
Home	93.86	6.14	52,482
Hospital	96.14	3.86	193,227
Wealth status of Women			
Poorer	94.73	5.27	165,345
Wealthier	97.34	2.66	80,521
Birth-order of Child			
First	95.63	4.37	92,339
Second	96.56	3.44	78,827
Third & above	94.50	5.50	74,700
Birth-Weight			
Not weighted	94.08	5.92	34,680
Low	97.67	2.33	156,437
High	90.85	9.15	54,592
Total	95.65	4.35	245,709

Table 2: Determinants of child mortality in India: Results from Bivariate probit model.

	Coefficient	S.E.	P>z
	Main equation: Outcome variable is probability of child Mortality		
Probability of Child Mortality			
Delivery in Health care Facility	-0.04	0.04	0.356
<20 years	0.14	0.01	0.000
>36 years	0.06	0.01	0.000
Higher Education	-0.14	0.02	0.000
Lower Birth-weight	-0.26	0.02	0.000
Higher Birth-weight	-0.69	0.01	0.000
Urban	-0.05	0.01	0.000
Constant	-1.28	0.03	0.000
	First equation: Instrumented variable is delivery in health care facility;		
	Instrumental variables are wealthier women and Third & above birth-order of child		
Delivery in Health care Facility			
Wealthier Women	0.76	0.01	0.000
Third & above Birth-order	-0.54	0.01	0.000
Constant	0.70	0.00	0.000
/athrho	0.17	0.02	0.000
rho	0.17	0.02	
Wald chi2(8)	26173.99		
Prob > chi2	0.000		
Log likelihood	-169320.46		
Likelihood-ratio test of rho	0.000		
chi2(1)	63.03		
Prob > chi2	0.000		

Table 3: Estimated Marginal Effect by Bi-probit model, NFHS-4.

	Coefficient	Std. Error	P>z
Delivery in Health care Facility	-0.003	0.004	0.359