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Does Parental Education Affect the Impact of Provision of Health Care on Health Status of Children? - Evidence from India

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Abstract

The objective of the study is to analyse the impact of provision of health care facilities on the child health status taking into account the utilization of these available facilities. The study offers an insight into how parental education plays a significant role in explaining the slow progress in the health status of children. The results confirm that additional provision of health care facilities leads to significant increase in utilization of institutional delivery services and antenatal care which in turn improves the health status of a child. At the same time, we have observed that mere provision of more health care services will not solve the problem at the rate required to achieve acceptable levels of child health status. The model for utilization of health services reveals the fact that, schooling affects health seeking behavior among women which in turn results in greater utilization of institutional benefits in a region where the services are available. Thus female education must be enhanced to increase the utilization of antenatal care at a faster rate. Further, educated parents can manage child care practices in more efficient ways which offer them an additional edge among those who availed those facilities. To have a better utilization of available health care services and to raise the pace of reduction in child mortality rates government has to pay attention to increase education level of adults along with the expansion of health care centres.

Keywords: Child health status, Health care services, Parental education, Child care, Ordered Probit Model.

JEL Code: I11; I12; I18

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Introduction

Despite the fact that India has experienced substantial economic growth over last decade, "India had the highest number of under-five deaths in the world in 2014, with 1.4 million children dying before reaching their fifth birthday" (UN, 2014). Since independence, the Government of India (GOI) formed several committees to formulate national health policies to provide universal health care system. First, the Bhore Committee was formed in 1946 with the principle of "nobody should be denied access to health services for his inability to pay" and the focus should be given on rural areas. The committee suggested integration of preventive and curative services at all administrative level. Primary health care centers were built up from 1952 to provide integrated health care services to the entire population with emphasize on rural areas (Sen, 2012). Meanwhile several other committees were appointed to review the health status; and alternative recommendations were given to improve the situation. Notably, the Central Government implemented the vision of the Sokhey Sub-Committee of having one community health worker for every 1000 people in 1970s (Goel, 2007). After the declaration in the Alma Ata conference in 1978, the joint panel of the Indian Council of Medical Research (ICMR) and Indian Council of Social Science Research (ICSSR) pointed out the importance of integrated and comprehensive health care system. Then the National Health Policy was endorsed by the Government of India from 1983 to achieve the goal of 'Health for All' by 2000. But universalization of these policies was not possible due to insufficient investment and a lack of decentralization; which resulted in wide disparities in health outcomes in each region.

Meanwhile the economic reforms resulted in a rapid growth in private health care sector in early 1990s. Due to increase in the role of private sector and public-private partnership, it was possible to increase total coverage of health care. Although public health expenditure as a proportion of Gross Domestic Product (GDP) remains at around 1% as before, the combined public and private spending on health reaches at around 4.5% of GDP in 2011 (Sen, 2012). Public health care centers include 1,47,069 Sub-Health Centres (SHCs), 23,673 Primary Health Centres (PHCs), 4,535 Community Health Centres (CHCs) and 12,760 hospitals (HLEG, 2011). Still private sector accounts for 93% of the hospitals and 85% of doctors of total health services.

The emphasis till 2005 was given to the supply side factors especially physical provision of health care facilities. Meanwhile the International Conference on Population and Development in 1995, after the first round of National Family Health Survey (NFHS) (1992-93), offered different perspective to the health policy framework. They focused on the comprehensive policies with a range of reproductive health services for women and a bunch of services for children were formulated. Several initiatives were undertaken by both central and state levels to revitalize the universal health coverage. Noteworthy, the National Rural Health Mission (NRHM) was implemented in 2005 to strengthen the public health care system in rural areas. The Reproductive and Child Health Programme (RCH), under the NRHM, gives special attention to the reduction of infant mortality rate, maternal mortality rate and total fertility rate. Notably, the Janani Suraksha Yojana (JSY) led to a significant increase in institutional deliveries from 7.39 lakhs per year in 2005-06 to about 90.37 lakh beneficiaries in 2008-09 accounting for an annual expenditure of Rs.1,241 crore (GOI, 2010).At the same time ASHA (Accredited Social Health Activist), AWW (Anganwadi Worker) and ANM (Auxiliary Nurse Midwives) workers provide additional support to strengthen the quality of antenatal and postnatal care to increase in actual utilization. As per NFHS data (2005-06), about 51 per cent pregnant women received 3 or more antenatal care checkups and 37.1 per cent women received post natal care within 48 hours (GOI, 2010).

Despite the expansion of total coverage and actual utilization of health care via PHCs, CHCs, sub-centers and hospitals, India is off track in terms of maternal mortality rate (MMR), IMR and U5MR (ESCAP-ADB-UNDP Asia–Pacific Regional MDG Report, 2012-13). India has managed to reduce infant mortality rate (IMR) from 129 deaths per 1,000 live births in 1971 to 53 in 2008 (GOI, 2010). The under-five mortality rate (U5MR) declined to 59 in 2010 (The Planning Commission[4], 2011). Still the progress in reducing the proportion of underweight children, U5MR and IMR is far below than what is required to achieve the Millennium Goal by 2015. In this regard, existing literature has pointed out several socio-economic factors in determining child mortality rates (Mosley & Chen, 1984; Chalasani, 2010; Ross & Mirowsky, 2010, Muldoon et al., 2011; NIMS, ICMR & UNICEF, 2012). Especially parental education is identified as a crucial determinant. But these micro level studies did not consider the utilization of health care services in their models which leads to misspecification error of the model. This study attempts to overcome the shortcoming and examine whether utilization of health care facilities has significant impact on health status of children after controlling other socio-economic factors. In addition preliminary analysis of NFHS data explores the fact that utilization does not have similar impact on health outcomes for all children. There is a wide disparity prevails among these

[4] http://planningcommission.gov.in/data/datatable/index.php?data=datatab

beneficiaries. Thus we analyse how actual impact of such utilization is getting affected due to lack of education among their parents.

On the other hand, as will be seen in more detail later, the NFHS data reveals that provision of health care facilities does not necessarily imply that individuals are availing those facilities. There exists a wide gap between provisioning and utilization of resources. That means supply of these health care facilities have not necessarily created a demand. Hence, this study attempts to examine the determinants of utilization of health care services other than availability; and whether the lack of education is responsible for such slow progress in utilization of available resources after provisioning those facilities in a village. Further, it seeks to examine the inter-linkages between provision of health facilities and child health status through the utilization of available services.

Existing literature (for instance, Mosley & Chen, 1984) suggest that a variety of health care practices are important in influencing the health of a child. This study has looked at only antenatal care and institutional delivery to capture the utilization of health facilities as information on these variables are available for all children irrespective of their survival status. The health outcome is defined as health status of children who were born between 4-5 years prior to each NFHS round. The health status is ordered in terms of the survival status and body mass index of children. Using an ordered probit model, we find that there is a significant impact of the utilization of health facilities on the health status of children; but the level of impact is conditional on their parents' educational level. Here lack of education among parents is responsible for having such lower impact among those who are availing antenatal care and institutional delivery services.

Additionally, the study shows that this is not the only reason for the slow progress in health outcomes. The model for utilization of health care services shows that availability (Das et al. 2001) and parents' education (Govindasamy and Ramesh 1997) have significant positive impact on the utilization. In addition, this analysis shows that in a village where health care center is available, educated mothers are more likely to utilize such facilities as compared to uneducated mothers. Thus education, mother's education in particular, improves the actual impact of available health services on their utilization. Besides, the study points out several other socio-economic factors which are responsible for such slow reduction in child mortality rates like other studies (Khan et al. 1994; Barlow and Diop 1995; Sugathan et al., 2001; Ahmed and Mosley 1997; Regmi and Manandhar 1997).

The following section describes the data used in this study, and provides some descriptive statistics on child health status and parents' education. Then the model specifications and estimation procedure are described in section 3. Results are given in section 4. Conclusions and policy implications are recommended in section 5.

Child Health and Parental Education – Some Stylized Facts

We use National Family Health Survey (NFHS) data for the analysis. It is a large scale, multi-round survey for a representative sample throughout India. The survey was conducted in three rounds in 1992-93, 1998-99 and 2005-06 respectively. The primary objective of NFHS is to collect national-level and state-level data on health and demographics for evaluating population and family welfare programs and strategies. The sample design followed in each NFHS state is uniform, systematic and stratified sample of households with two stages sampling in rural areas and three stages sampling in urban areas.

In each round, the household questionnaire was used to list all resident of each sample household and all visitors who slept in the household the night before the interview. Basic characteristics of each person were interviewed including age, sex, education, occupation, relationship with head of the household, marital status etc. Data on sources of drinking and non-drinking water, sanitation facilities and asset related variables; like irrigated & non-irrigated land, type of house, cattle, vehicle etc. were also collected. The household questionnaire was then used to shortlist those women who were eligible to respond for the woman's questionnaire. The eligibility criterion has changed in second round. Ever married women aged 13-49 years were selected in the first round whereas the age limit has changed to 15-49 in second and third rounds. 89,777 eligible women were interviewed in the first round, whereas 131,596 and 92,318 for respective rounds. The woman's questionnaire was designed to collect data on their background, reproduction, contraception, health of children, fertility preferences, husband's background and height &weight and also information on utilization of available health facilities both in public and private sector. Additionally, village level surveys collected data on availability of both government and private health facilities like hospital, sub-center, public health center, mobile health unit and private health care units in the first and second rounds.

The data used in this study consists of children born between 4-5 years before each NFHS survey. We chose the range 4-5years so that we have atleast 4 years of time period to classify them according to their survival and health status. The final dataset contains 14,127, 7,129 and 25,675 children from NHFS data 1992-93, 1998-99 and 2005-06 respectively.

Table 1 presents the descriptive statistics of the dependent variable and covariates for each round separately. It can be seen that the survival rate has increased from 86% in 1992-93 to 92.97% in 2005-06 whereas mortality rates of different age groups are declining over time. Specifically, the first month after the child was born is the most crucial life span for survival as a significant percentage of children died before 1 month of age. In the pooled dataset, 2,574 children died before 1 month of age and critically we observe that only 27% of them were born in a health center and 37% had received antenatal care.

Table 1: Descriptive statistics on health outcomes of children and its determinants

Variables	1992-93	1998-99	2005-06
Health Outcomes			
Survival Rate	86.20%	91.32%	92.97%
Mortality Rate (1-5 years)	2.07%	1.07%	0.99%
Mortality Rate (1-12 months)	4.11%	2.76%	1.55%
Mortality Rate (0-1 months)	7.62%	4.85%	4.48%
Utilization of Health care facilities			
Availed both facilities	25%	30%	28%
Availed one service	36%	36%	40%
Availed no service	39%	34%	32%
Parents' Education			
Parents completed primary education (%)	61%	87%	72%
Mother education in years (Mean)	2.97	3.55	4.76
Father education in years (Mean)	5.75	10.45	6.89
Water & sanitation			
Safe drinking water	33%	36%	25%
Sanitation facility in own residence	26%	27%	33%
Willingness, complications & care			
Wanted pregnancy	78%	82%	80%
Caesarian	12%	7%	10%
Months breastfeeding	18.82	19.76	19.94
Breastfeeding practice	0.61	0.74	0.55
Affordability			
Normalised asset index	9.41	30.71	37.60
Other social & demographic factors			
Radio	41%	37%	30%
TV	22%	34%	44%
Radio / TV	46%	51%	56%
Electricity	52%	62%	67%
Bicycle	42%	48%	45%
Motorcycle	9%	11%	17%
Car	1%	2%	3%
Motorised vehicle	10%	12%	18%
Hindu	76%	78%	70%
Muslim	14%	13%	16%
SC	13%	19%	18%
ST	12%	12%	16%
Number of household members	7.80	7.50	6.69
Relation to housheold head (parents)	57%	56%	62%
Sex household head (Male)	93%	94%	90%
Age of Household head	43.55	43.30	42.21
Total children ever born	3.49	3.21	3.23
Age Mother at 1st birth	19.14	19.02	19.78
Marital status mrd	98%	99%	98%
Age at first marriage	17.15	17.15	17.26
Gender of the child (Male)	52%	52%	52%
Birth order	2.99	2.89	2.70

Source: author's estimates

In our sample, only 25% households availed both antenatal care and delivered in a health center in 1992-93 with an insignificant increase to 28% in 2005-06. Households accessed atleast one facility has increased from 61% to 68% in round 1 and 3 respectively, in other words about 32% children did not avail any of these facilities in 2005-06.

Percentage of parents completed primary education has increased from 61% in 1992-93 to 72% in 2005-06. In this dataset, households are mostly male headed, more than 70% belong to Hindu religion and more than 25 % of total households are from scheduled castes (SC) and scheduled tribes (ST) in each round. Only 25% households in the sample have access to safe drinking water whereas 33% households have sanitation facilities in their own residence. About 67% households have electricity in 2005-06 which is significantly higher than 52% in 1992-93. About 50% of total households have either television or radio which may represent awareness and sources of information about the use of contraceptives and child care practices. Here about 15% households own a motorized vehicle (car, motorcycle or tractor) which may increases their ability to cover longer distance in order to access health care services in or outside the village. Age at first marriage was about 17 years whereas total fertility rate (given as total children ever born) remains high with more than 3 children on average. About 52% children in the sample are male.

Model Specifications and Estimation Procedure

We have defined the health status of children in six categories which are ordered from very good to very bad health condition (1, 2, …, 6) on the basis of their survival status and body mass index (BMI). The health status of a child is 1 if the child is alive with normal BMI, 2 if the child is alive with above normal BMI (BMI greater than 25), 3 if the child is alive with less than normal BMI or malnourished (BMI less than 18.5), 4 if the child died between 1-5 years of age, 5 if the child died between 1-12 months of age, 6 if the child died before 1 months of age. Here BMI is calculated as $(Weigh\ in\ kg)/(Height\ in\ m)^2$.

The analysis considers six dimensions of factors which may affect health status of a child: utilization of health care facilities, parental education, water & sanitation facilities, willingness, complications & care, affordability and other social & demographic characteristics.

Initially several health care practices were taken into consideration to capture the utilization of health facilities; like place of delivery, antenatal care, postnatal care, nutritional intake during the pregnancy, immunization, polio, ORS intake while suffered by diarrhea and other health care practices during pregnancy and after the delivery. But only two variables, viz., place of delivery and antenatal care are finalized in the model because they are crucial for determining child health status and survival rate (Mosley & Chen, 1984); and more importantly, these information are available for all three rounds of NFHS

for all selected children irrespective of their survival status. Finally, three indicator variables are created as availed both facilities (ABF), availed either one of these facilities (AEF) and availing health facilities (AHF). The variable ABF takes value 1 if the delivery took place in a public or private health care center by trained personnel and the child received antenatal care and 0 otherwise. AEF takes value 1 if the respondent (mother) availed either of these facilities and 0 otherwise; whereas AHF takes value 1 if she avails atleast one of these facilities and 0 otherwise.

Mother's and father's education are measured in years of formal education completed and parents' education (PE) is taken as a dummy variable which is coded as 1 if the child's mother or father completed primary education. Additionally, interaction between uneducated parents and AHF is considered as an important determinant to understand whether the impact of accessing those facilities gets hampered due to lack of education of their parents. Actual impact of utilizing those facilities on child's health status is hypothesized as conditional on the education level of their parents. In other words, the hypothesis tests whether educated parents can handle the child care practices in a better way which plays an additional role to determine actual impact of availing those services.

Along with these above mentioned variables we have incorporated several control variables in the model to estimate their actual impact. For instance, source of safe drinking water and access to sanitation facilities are considered as important determinants of child health status in existing literature (Muldoon, et al., 2011). Here source of drinking water is assumed to be safe if the household uses piped water from public tap or in own residence or ground water from hand pump in the yard or in public location. Toilet facility in own house takes value one if the household has either flush or pit toilet in own residence whereas a separate covariate is constructed for sanitation which considers either toilet facility is present in own residence or the household has access to public and shared toilet.

NFHS collects information on willingness of having the child which is defined as wanted pregnancy. Then caesarian deliveries are taken as a proxy to capture the complication during the pregnancy, if any. The breastfeeding practice is a crucial variable for child health (Engle, et al., 1997) which is calculated as months of breastfeeding divided by age of the child in months. This variable captures the care practices of mother for her child.

Asset index is considered as a control variable to reflect the affordability of the household for both health care services and nutritional intake necessary during and after the pregnancy. The asset index is constructed by applying principal component analysis (PCA) using the following assets and housing characteristics: household electrification, drinking water source, type of toilet facility, type of flooring, material of exterior walls, type of roofing, cooking fuel, house ownership, number of household members per sleeping room, ownership of a bank or post-office account, ownership of a mattress, a pressure cooker, a

chair, a cot/bed, a table, an electric fan, a radio/transistor, television, a sewing machine, a mobile telephone, any other telephone, a computer, a refrigerator, a watch or clock, a bicycle, a motorcycle or scooter, an animal-drawn cart, a car, a water pump, a thresher, a tractor and irrigated & non-irrigated land. But, inclusion and definition of variables in each round vary depending on the availability of data and nature of existing variables. To make them comparable, the asset index is normalized as

$$\text{Normalized Asset Index (NAI)} = \frac{\text{Actual Value} - \text{minimum value}}{\text{Maximum} - \text{Minimum Value}} * 100$$

Among other socio-economic factors; radio/television, vehicle, electricity, religion, caste, adult child ratio, birth order of the child, rural, age at first marriage, age at first birth, total children ever born, gender and relation of the head of the household are taken as other control variables which may have impact on the health condition of each child. The variable radio/television is taken as a source of information on child health care practices whereas vehicle is considered as a proxy for households' ability to reach to a health care centers. Here adult child ratio is calculated as total number of adult members (above 15 years of age) in the household divided by the total number of children including those who died before 5 years of age. The adult child ratio indicates total number of adult members available in the household per child to take care of.

The model for child Health Status (CHS) can be specified as,

$$CHS^* = \alpha_1 + \alpha_2 PE + \alpha_3 \text{ABF} + \alpha_4 \text{AEF} + \alpha_5 \text{AHF} * \text{PE} + \gamma X + \varepsilon \quad \ldots\ldots\ldots (1)$$

The CHS^* is a latent variable which is observed in discrete form through the following mechanism (Greene and Hensher; 2009);

$$\text{CHS}_\text{i} = \text{k if } \partial_{k-1} \leq CHS_i^* < \partial_k \; for \; k = 1,2 \ldots, 6; \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

$$i = 1, \ldots, N; \; \partial_0 = -\infty \; ; \; \partial_J = \infty$$

In equation 1, it is assumed that the error term ε is normally distributed with an expected value of zero and variance of unity whereas X is a vector of control variables which are strictly assumed to be uncorrelated with the error term, ε; and $\gamma$is a vector of coefficients of included control variables. The ∂s are unknown threshold parameters which are estimated with α's. These threshold parameters can be used to estimate different observed values of CHS and these∂'s can be interpreted as intercepts of the estimated model.

As the dependent variable (CHS) is defined in an ordered scale 1-6 where 1 represents best and 6 implies worst health status, we use fixed effect ordered probit model to estimate the health status of children. Since we are using independently pooled cross section data where each survey represents a random sample from the population, this rules out correlation in

the error term within and between each survey's observations (Wooldridge, 2012)[5]. Time effects are included in each model to incorporate the change in relation in each round. The concordant ratio, likelihood ratio test, Score test and Wald test statistics are mentioned to show overall performance of each model.

In the second level of our analysis, the model for utilization of health care tests whether availability of health care services has significant impact on actual utilization of antenatal care and institutional delivery after controlling the impact of other important socio-economic and demographic factors. Here we cannot include the third round of NFHS; as village level survey was conducted only in first two rounds. Notably, the village level questionnaire includes variables related to availability of health facilities and other infrastructure like school, roads and electricity in a village.

The outcome variable, utilization of health facilities (UHF) takes value 1 if the delivery took place in a public or private health care center by trained personnel and the child has received antenatal care; 2 if the respondent (mother) availed either one of these facilities; and 3 otherwise. Among relevant covariates, parental education and availability of health facility are considered as the focus point of our study. Here availability is captured with two separate variables as public health facility (PUBHF) and private health facility (PRIHF). The PUBHF is coded as 1 if the village has any kind of government health facility and 0 otherwise. Similarly, PRIHF captures the presence of private health facilities; and availability of health care center (AHC) is taken as 1 if atleast one kind of health facilities is present in the region. In addition, the interaction terms between the presence of such facilities (AHC) and parental education (PE) are incorporated to test whether education encourages more to avail those facilities in a region where the facility is already present. More specifically, the significance of the coefficient explains whether parental education can influence the impact of supply side factors on the utilization of the utilities.

The list of control variables used in this model is same as equation 1, excluding breastfeeding practices, sanitation and water sources, to capture the impact of other socio-demographic factors which may affect the actual utilization of available resources.

The model for utilization of health facilities (UHF) is specified as;

$$UHF^* = \beta_1 + \beta_2 PE + \beta_3 \text{PUBHF} + \beta_4 \text{PRIHF} + \beta_5 \text{AHC} * \text{PE} + \delta Z + \epsilon \quad \ldots\ldots\ldots (3)$$

The UHF^* is a latent variable which is observed in discrete form through the following mechanism;

$$\text{UHF} = \text{j if } \mu_{j-1} \leq UHF_i^* < \mu_j \; for \; j = 1,2,3; \quad \ldots\ldots\ldots\ldots\ldots\ldots (4)$$

[5]Wooldridge, Introductory Econometrics (5th edition, 2012)

$$i = 1, \ldots, N;\ \mu_0 = -\infty\ ;\ \mu_J = \infty$$

In equation 3, the error term$\epsilon$is assumed to be normally distributed with an expected value of zero and variance of unity whereas Z is a vector of control variables which are strictly assumed to be uncorrelated with the error term, ϵ; and $\delta$is a vector of coefficients of included control variables. Here AHC $*$ PE is the interaction term between AHC and PE. As the dependent variable is measured in an ordered scale from 1 to 3, we apply fixed effect ordered probit model as before.

Results

Child Health Status

The primary hypothesis of our analysis is to test the impact of parental education and utilization of health facilities on child health status and how the impact of such utilization is conditional on their parental education. Here models are estimated with different combination of control variables to test the robustness of the results. In model 1, we have parental education, utilization of health facilities and their interaction term with certain essential demographic control variables including asset index, caste, religion, adult child ratio, relation to household head and his/her gender and age of mother at first birth. Model 2 includes water sources and sanitation facility in own house as additional factors to determine health status of children whereas model 3 adds the covariates for complication in pregnancy (captured by caesarian cases), willingness to have the child (wanted pregnancy) and breastfeeding practice to capture essential care taken by mother. Then model 4 has combined all these above mentioned covariates to test how the coefficients are changing with each model specification. Additionally, year dummies for NFSH rounds 1998-99 and 2005-06 are included in each model to incorporate the time effects. Here insignificant variables are not included in the final model.

The result shown in Table 2 suggests that mother's education plays an important role in determining health status of their child (Hobcraft et al., 1984; Mosley and Chen, 1984; Hobcraft, 1993; Chalasani, 2010; Ross and Mirowsky, 2010; NIMS, ICMR and UNICEF, 2012). The probability of having a healthy child increases significantly by around 0.01 points with an increase in years of mother's education. In addition, the result confirms a significant positive impact of utilization of health care services on the child health status irrespective of the inclusion of other controlled variables. Here availing both antenatal care and institutional delivery services significantly increases the survival rate of a child with normal BMI by 0.18 which is more than those who have availed only one facility (0.15). Thus the probability of survival rate increases by 0.33 (i.e. 0.18+0.15) if they utilize atleast one facility.

Table 2:Estimated models for health status of children using ordered probit model

Variable	Model 1	Model 2	Model 3	Model 4
Intercept1	-2.344***	-2.356***	-2.857***	-2.873***
Intercept2	-2.237***	-2.249***	-2.751***	-2.767***
Intercept3	0.924***	0.913***	0.487***	0.472***
Intercept4	1.011***	1.001***	0.579***	0.564***
Intercept5	1.212***	1.201***	0.799***	0.784***
Mother education in years (MEY)	0.005**	0.004*	0.009***	0.008***
Availed both facilities (ABF)	0.158***	0.145***	0.201***	0.183***
Availed either One Facilities (AEF)	0.175***	0.173***	0.153***	0.149***
Availed health facilities (AHF) X Parents not educated	-0.090***	-0.089***	-0.096***	-0.095***
ABF X Round3	0.149***	0.157***	0.061*	0.071**
Safe drinking water		0.036**		0.065***
Sanitation in own house		0.051***		0.044**
Wanted pregnancy			0.081***	0.081***
Caesarian			-0.140***	-0.139***
Breastfeeding practice			0.722***	0.726***
Normalised asset index	0.004***	0.003***	0.006***	0.005***
Normalised asset index X Round3	-0.004***	-0.003***	-0.004***	-0.004***
Hindu	-0.183***	-0.175***	-0.217***	-0.210***
Muslim	-0.085***	-0.085***	-0.100***	-0.101***
ST	0.056**	0.051**	0.049**	0.046**
Adult child ratio	0.071***	0.070***	0.043***	0.043***
Relation to household head (parents)	0.128***	0.124***	0.097***	0.091***
Sex household head (Male)	-0.083***	-0.080***	-0.056**	-0.053**
Age of Mother at 1st birth	0.009***	0.009***	0.010***	0.010***
Round 2005-06	0.085***	0.105***	0.094***	0.121***
Round 1998-99	0.150***	0.170***	0.024	0.047*
No. of Obs.	46931	46931	46931	46931
Concordant Ratio	62.3	62.4	65.3	65.4
Likelihood Ratio Test	1103.8***	1116.4***	2648.9***	2670.1***
Score Test	1080.2***	1093.6***	2639.0***	2662.9***
Wald Test	1070.1***	1080.9***	2428.9***	2445.4***

Sources: author's estimates.

Notes: Round3 is a dummy variable takes value 1 for NFHS 2005-06 and 0 otherwise.

***, ** and * represent 1%, 5% and 10% significant levels for a two-tail test.

"X" refers to interaction terms between two variables

Moreover, Table 3 explains how health status varies across parental education level among those who availed health facilities. We can observe that, mortality rates for relevant age groups are significantly lower for those children who have utilized available facilities irrespective of their parental education level. At the same time if we concentrate to the health status of children who have accessed those facilities, we can notice that parents' education offers them an extra edge and the survival rate is further increased to 94%. This phenomenon is verified by the inclusion of the interaction term between uneducated parents and the utilization of health care. The coefficient explains that the probability to have a healthy child declines by 0.095. Among those who availed these facilities, children

with less educated parents have lower probability of being healthy than those with educated parents. Thus actual impact of utilization of such health facilities gets weakened due to lack of education of their parents. This may be due to the fact that an increase in education generates an improvement in health knowledge (Altindag, et al., 2011) which results a better choice of health inputs and child care practices; and this contributes an additional positive influence on the health status of their children (Govindasamy and Ramesh, 1997).

Table 3: Distribution of age-wise mortality rates by utilization of health facility and parents' education

Health Facility	Parents Education (Primary)	Mortality Rate (Below 1month)	Mortality Rate (1-12month)	Mortality Rate (1-5Years)	Survival Rate
Not Availed	No	8%	5%	3%	84%
	Yes	7%	4%	2%	87%
Availed	No	6%	3%	2%	90%
	Yes	4%	1%	1%	94%

Water and sanitation are added in model 2 with all covariates included in Model1. In the analysis, piped water and ground water are taken as safe water source; and flush or pit toilet in own residence is taken as improved sanitation. The result suggests that improved sanitation facilities in own residence and access to safe drinking water have positive impact on the health status of child. It has been tested that access to shared or public toilets does not improve child health status significantly. Interestingly, the coefficients of mother's education, accessing health facility and their interaction have not changed significantly after inclusion of water and sanitation, although they have significant impact on the health status. Thus water and sanitation have independently explained the health status of children which was not explained earlier with model 1 specification.

Three crucial variables are included in model 3 viz., wanted pregnancy, caesarian and breastfeeding practice. The covariate "wanted pregnancy" captured the willingness to have the child which has a positive and significant impact on the health status. The "caesarian" is taken as a proxy of any kind of complications during the pregnancy or delivery of the child which may have a negative impact on the health status or the survival status of the child. Here we get significant and negative coefficient as expected. In the literature of medicine, breastfeeding practice is considered to be one of the most important factors for health of a child. Here breastfeeding practice is calculated as month of breastfeeding divided by the age of the child in months. Notably breastfeeding practice is turn out to be most important among included covariates. The probability of a healthy child with normal BMI increases significantly with breastfeeding practices by 0.72. Additionally, inclusion of these variables contributes a marginal change in coefficients of other important covariates like mother's education and availing health facilities (both or one) may be due to fact that model 1 and 3 were suffering with an omitted variable bias.

Asset index is taken as proxy for consumption pattern and affordability of health services of the households. Here asset of a household improves health status significantly irrespective of other covariates but the effect gets deteriorated by 0.004 in 2005-06 (captured by the interaction term between asset index and a dummy variable for NFHS 2005-06).

Among other social and demographic variables; Hindu and Muslim families are doing badly than other religion whereas an interesting finding shows children from a scheduled tribe family have significantly better health condition than other communities. Furthermore, age of mother at first birth, adult child ratio and households headed by parents have positive impact whereas male headed household has negative impact on child health status.

Model 4 includes all significant variables. If we compare the estimated results of different models, we can observe that the signs and magnitudes of all coefficients are overall consistent across models. These models confirm the fact that our result is robust and irreversible. Thus the actual impact of utilization of health facilities on child health status is conditional on the education level of their parents.

Utilization of Health Facilities

The second objective of our analysis is to examine important determinants of the utilization of health care services. This study is done with the pooled data from first two rounds of NFHS because third round does not have any village level survey which was necessary to construct the variable "availability of services".

Table 4 shows total number of women who had received antenatal care and availed institutional delivery by trained personnel against availability of health care facilities in a public or private health center. More than 25% households did not utilize any health facilities in spite of the fact that health care centers were available in the village. This section offers an additional explanation for experiencing such slow progress in health outcomes after the vast increase in total coverage of health care facilities by identifying leading factors of determining actual utilization of the available services.

The estimated models for utilization of health services are given in Table 5. As preceding section has pointed out the importance of antenatal care and place of delivery as important determinants of health status of a child, three separate models are estimated to have a thorough understanding about the determining factors of accessing these health facilities in India. The first model applied ordered probit model with time effects on the variable "availed services" which is defined as a combination of antenatal care and delivery place (categorized as both, one & none). Second and third model have given special attention to each services separately applying probit model.

Table 4: Availability Vs. Utilization of Health Facilities

		Availed Facilities				% of Children Did not utilize any facilities
	Availability	Both	One	None	Total	
1992-93	PHC+SubCentre+Hospital	2,869	2,724	**2,055**	7,648	**27**
	PHC+SubCentre+Hospital+ Other Govt. Health Facilities	3,159	3,761	**3,315**	10,235	**32**
	Private Health Centre	2,761	2,506	**1,914**	7,181	**27**
1998-99	PHC+SubCentre+Hospital	1,690	1,496	**1,104**	4,290	**26**
	PHC+SubCentre+Hospital+ Other Govt. Health Facilities	1,868	1,955	**1,549**	5,372	**29**
	Private Health Centre	1,702	1,634	**1,279**	4,615	**28**

Here, availability of both private and public health care facilities (PRIHF and PUBHF) have positive impact on utilization of resources. But second and third model clarifies the fact that the PRIHF has greater impact on the probability of availing institutional delivery service whereas PUBHF is more important to increase the probability of availing antenatal care. This may be due to the poor quality of services provided by the public health care centers. Mother's education (MEY) has a positive impact on the probability of accessing those facilities (Govindasamy and Ramesh, 1997) by around 0.07. In addition, the interaction between availability of health care (AHC) and MEY is significant for first two models. In a region with the provision of atleast one of these health facilities, the probability of actual utilization of these services increases significantly with mother's education level. But father's education does not play any significant role in determining the actual utilization of these services. That is why the model considers only mother's education instead of parents' education. If we observe the results of second and third models; the interaction term between AHC and MEY is significant for antenatal care but not for place of delivery. Thus the impact of provisioning health care center on availing institutional delivery services in a health center is constant for all children irrespective of the education level of their mother whereas the probability of receiving antenatal care is conditional on mother's education in an area with health care facilities (Figure 1).

Table 5: Estimated models forthe utilization of health facilities using probit model

Variables	Utilization of Health Facilities	Antenatal Care	Place of delivery Health centre
Intercept	-1.742*** -0.421***	-0.632***	-1.458***
Public Health faciltiy (PUBHF)	0.179***	0.192***	0.132***
Private Health faciltiy (PRIHF)	0.172***	0.118***	0.258***
PRIHF X Round2	-0.110***	-0.064	-0.219***
Mother education in years (MEY)	0.075***	0.070***	0.077***
MEY X Round2	-0.001	0.002	-0.012**
Availability of health care (AHC) X MEY	0.013**	0.022***	0.005
Normalised asset index	0.014***	0.020***	0.008***
Normalised asset index X Round2	-0.010***	-0.018***	-0.005**
Radio/TV	0.097***	0.101***	0.083***
Electricity	0.318***	0.352***	0.234***
Motorised Vehicle	0.091***	0.06	0.110***
Hindu	-0.167***	-0.125***	-0.218***
Muslim	-0.188***	-0.171***	-0.213***
SC	-0.089***	-0.011	-0.199***
ST	-0.228***	-0.146***	-0.372***
Adult child ratio	0.046***	0.033***	0.053***
Relation to household head (Parents)	0.246***	0.240***	0.232***
Sex household head (Male)	-0.366***	-0.303***	-0.402***
Age of household head	0.003***	0.003***	0.002**
Age of Mother at first marriage	0.042***	0.033***	0.047***
Birth order	-0.086***	-0.076***	-0.096***
Round2	0.169***	0.142***	0.316***
Rural	-0.348***	-0.181***	-0.461***
No. of Obs.	21256	21256	21256
Concordant Ratio	79.5	79.1	84.5
Likelihood Ratio Test	9863.6***	6002.8***	7356.1***
Score Test	8079.6***	5020.3***	6942.6***
Wald Test	8263.8***	4327.6***	5532.8***

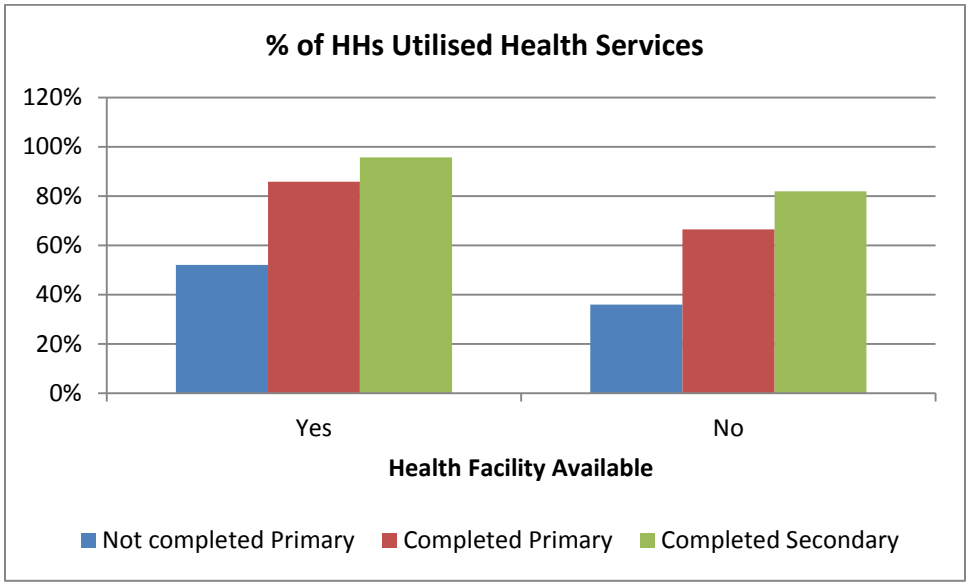
Sources: author's estimates.

Notes: Round2 is a dummy variable takes value 1 for NFHS 1998-99 and 0 otherwise.

***, ** and * represent 1%, 5% and 10% significant levels for a two-tail test.

"X" refers to interaction terms between two variables

Figure 1: Utilization of health care services by availability and mother's education



Here asset index captures the affordability of each household which has a significant positive impact on the utilization of health facilities (0.014) but the level of impact declines by 0.01 in 1998-99 (captured by the interaction term between AHC and round2) due to increase in total coverage of health care facilities by public sector.

Several other control variables are included in the model. Here awareness (captured by TV/Radio), electricity, accessibility (motorized vehicle), adult child ratio and age of mother at first marriage have positive impact on the probability of accessing available facilities whereas and other socio-demographic factors like birth order, male headed family, backward castes (SC and ST), Hindu and Muslim households have less probability of utilizing the available heath facilities. Children from rural areas have lower probability as compared to urban areas.

Conclusions and Policy Implications

The objective of the study is to analyse the impact of the provision of health care facilities on the child health status taking into account the utilization of these available facilities. The study offers an insight into how parental education plays an additional role in explaining the slow progress in the health status of children.

The analysis is done in two segments. First, we have examined the impact of utilization of health care facilities on the health status of children after controlling other determining factors. The health status is defined in six categories which are ordered from very good to very bad health conditions on the basis of their survival status and body mass index (BMI). Here we consider six dimensions of factors which affect health status of a child: utilization

of health care facilities, parental education, water & sanitation facilities, willingness, complications & care, affordability and other social & demographic characteristics. In addition the interaction between parental education and utilization of health care is incorporated in the model to examine whether lack of education among parents affects the actual impact of the utilization. Ordered probit model is applied to estimate the specified model.

The result shows that both utilization of these services and mother's education improve the health status of a child. Here probability of having a healthy child increases significantly if they availed both antenatal care and institutional delivery services as compared to only one service. But the significance of the interaction term confirms that lack of education among parents dampens the actual impact of the utilization of available facilities on the health of a child. In other words, educated parents can manage child care practices in an efficient way which offers them an additional edge among those who availed those facilities. Among others determining factors, having toilet facility in own residence and access to safe drinking water play significant role in improving the health status whereas households from Hindu and Muslim religion are doing badly than other religion. Interestingly, children from scheduled tribe community have significantly better health condition than other communities. Furthermore, age of mother at first birth, adult child ratio and households headed by parents have positive impact whereas male headed household has negative impact on child health status.

In the second level of our analysis, the model for utilization of health care tests whether providing more health care centres has significant impact on the utilization of antenatal care and institutional delivery after controlling the impact of other important socio-economic and demographic factors. As the dependent variable is measured in an ordered scale, we apply ordered probit model as before. NFHS data discloses that more than 25% households did not utilize any health facilities in spite of the fact that health care centers were available in the village. This section offers an additional explanation for experiencing such slow progress in health outcomes after the vast increase in total coverage of health care facilities by identifying leading factors of determining actual utilization of the available services.

The results confirm that additional provision of health care facilities leads to significant increase in utilization of institutional delivery services and antenatal care. At the same time, we have observed that mere provision of more health care services alone will not help to reduce the mortality rates of children at the rate required to achieve acceptable levels of child health status. The model reveals the fact that, schooling affects health seeking behavior among women which leads them to greater utilization of institutional benefits in a region where the facilities are present. Here, father's education does not have any significant impact on the probability of utilization. Thus female education must be

enhanced to increase the utilization of antenatal care at a faster rate. In addition asset of the household, awareness (captured by TV/Radio), electricity, accessibility (motorized vehicle), adult child ratio and age of mother at first marriage have positive impact on the probability of accessing available facilities whereas other socio-demographic factors like birth order, male headed family, backward castes (SC and ST), Hindu and Muslim households affect negatively. Children from rural areas have lower probability as compared to urban areas.

Hence we can conclude that, to have a better utilization of available health care services and to increase the pace of reduction in child mortality rates; government has to pay attention to increase education level of adults, women in particular, along with the expansion of health care coverage. Awareness has to be created among the uneducated parents, who did not complete primary education, to fill the gap about the knowledge and importance of availing health care facilities for children between educated and uneducated parents. Knowledge has to be transferred among adult population regarding child care practices with an emphasis to the rural areas.

For instance, policy should be initiated to encourage women for availing antenatal care and delivery services. In this regard, Janani Suraksha Yojana (JSY) is implemented in 2005 under the National Rural Health Mission by modifying the National Maternity Benefit Scheme (NMBS). Under this scheme, institutional delivery is promoted among poor pregnant women by financial assistance of Rs.500 per birth up to two children for those women who have attained 19 years of age and belong to BPL families. After the intervention, percentage of institutional delivery has increased significantly across states but still considerably less than 100% level (UNFPA, 2009). Hence this kind of program has to be implemented extensively across states.

But the results of the study are conditional on certain limitations of the data. First of all, NFHS does not provide data on household expenditure and nutritional intake for all three rounds. Thus we have constructed asset index by considering all asset related items of each household to capture the capability of the particular household to spend on food and health. Second, child health status depends on several health care practices other than antenatal care and institutional delivery. Notably, postnatal cares like vaccination for polio, DPT and measles, health care practices if the child has diarrhea, fever or pneumonia, and food consumption of both mother and child may have significant role in determining health status of the child. But information on these variables in the NFHS does not cover all the children in the target group for this study, and hence these variables could not be included here. And third, we had to rely on data comprising first and second rounds of the NFHS to estimate the model for utilization of health services as data on availability of health care services were not collected in the third round. Nevertheless the study has done several checks for robustness of each model to conclude the findings.

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