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Demand for maternal health inputs in West Bengal-Inference from NFHS 3 in India

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Abstract

Using data from National Family Health Survey-3 (NFHS-3) for India this paper attempts to look at various socioeconomic factors that account for the demand for maternal health inputs in an Indian state-West Bengal. Conditional Mixed Process estimation is used to estimate the demand functions for prenatal care and hospital delivery. We jointly estimate both these equations to control for selection bias in the use of health inputs. However, exogenous estimation results are also provided. It has been observed that the place of residence, standard of living, and educational level of women are those covariates that remarkably increase the demand for both the maternal health inputs. An impression we derive from the analysis is that the infrastructural facilities, supply of health professionals, workers, educational attainment of women have to be emphasized on to contain the undesired problems during pregnancy and child-birth. At the same time access to information and whether the women can keep some money for own use also raise the demand for quality care associated with pregnancy. This also indicates a linkage between mother's autonomy and healthcare utilization behavior.

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1. Introduction and the Context

Health is such a pervasive issue that it has to be taken care of much before even the birth of a child. This argument needs no further qualification as malnutrition of mother, socio-economic condition of the family, social status of the mother etc. remarkably account for the health of both the fetus and the mother simultaneously. Timely intervention through proper health care policy can only ensure a healthy baby, the major precondition for human capital formation and sustainable economic development. In this regard both antenatal and postnatal care act as complementary in nature though there exists a transitionary gap which is covered by the process of child-birth. Instead of having sufficiently good prenatal care the new born baby and the mother herself may not be free from any life-threatening problem if the mother or her family fails to arrange for a scientific delivery provision. On the other hand new born babies are extremely susceptible to infection and other health related problems, failure of utilizations of proper delivery care may lead to perinatal, postnatal and child mortality. Therefore precisely speaking we observe differential impact with respect to health outcome and utilization of health inputs based on socio-economic status. And the variation in socio-economic status of households affects the variables of interest differently. So in this paper we emphasize the transitional process between prenatal and postnatal care – child-birth. We direct our focus on the determinants of both prenatal care and hospital delivery characterized by required counselling, maternal care, safe delivery mechanism, trained doctors and health professionals, an environment conducive to develop sufficient immunity for the new-born[1].

In most of the developing countries, predictably, pregnancy care and delivery care are not yet institutionalized and hence lead to pregnancy complications and high-risk delivery. India, in general is no exception. In the last couple of decades a vast literature has emerged in and around this issue. In this connection Acton's paper (1975) is an interesting publication in that it focuses on how nonmonetary factors like travel distance etc may impact on the demand for "free" and "non-free" maternal health care. A whole lot of papers are written in the same direction later. Existing literature includes Halim et al (2011), Ensor and Coopers (2004), Ensor and Ronoh (2005), Kerber et al (2007), Mekonnen et al (2002), Birmeta et al (2013), Becker et al (1993), Celik et al (2000), Babalola et al (2009), Raghupathy (1996), Short et al (2004), Makate (2015) etc. Halim et al (2011) use data on Nepal to confirm that use of antenatal care reduces child mortality which is also influenced by maternal and paternal educational level as they increase the utilization of maternity care. Ensor and Coopers (2004) is an interesting addition to the literature in that the increased demands due to change in socio-economic factors may not always be sufficient for higher consumption unless it is matched by improved supply. While on the other hand Kerber et al (2007) talk about why a population level or public health framework based on integrated service delivery is required to ensure increased quality of maternal, new-born, and

[1] We first figure out the determinants of prenatal care as this response variable is used later as a regressor for child-birth outcome.

child health. Ethiopai's case is discussed in Mekonnen et al (2002) where he argued why maternal education, marital status, place of residence, religion turn out to be most important pathways in influencing the use of maternal health care services. In the same line of Mekonnen et al (2002), there is another paper by Birmeta et al (2013), though the study area was a part of Ethiopia. They pointed out the relevance of community awareness along with other conventional covariates. Berker et al (1993) deal with the case of Phillipines, Celik et al (2000) look at the story of Turkey, Babalola et al (2009) examine Nigeria, while Short and Zhang (2004) do the same for China just to arrive at similar conclusions. However, Raghupathy (1996) goes deep in this kind of analysis and figures out the differential effects of various levels of education in rural and urban areas of Thailand. Very recently Makate (2015) has also done a more rigorous investigation for Zimbabwe. He uses the same technique that we use here. In addition to these Ensor and Ronoh (2005) is a commendable compilation of the existing literature on how health care services are financed. Though this paper has not been directly connected with our paper, it nicely talks about why financing issues become significant for prenatal care. So, in a nutshell, these papers focus on the correlates of demand for maternal health care and its possible good and bad consequences for both the child and the mother. Furthermore, it has also been shown as to how and why institutional delivery reduces the chance of complications related with child-birth. In what follows these analyses directly point to the relevance of hospital delivery (hereafter HD). So demand for both modern prenatal care (hereafter PC) and HD are very important factors to have long lasting influence on economic development in general through human capital formation.

On the other hand, using second round data of NFHS in India (while we use the same for third round) Maitra (2004) attempted to check how status of women in the household diverts resources to be used in maternal health inputs. He used the technique of joint estimation which is also used in our paper. His and our papers are predominantly based on Panis and Lillard (1994) that had used full information likelihood method of estimation. In another paper by Maitra and Pal (2007) the problem of unobserved heterogeneity is also dealt with, though for a slightly different outcome variable. This paper discussed how different health inputs are associated with child mortality in Bangladesh. While the influence of women's autonomy on the demand for maternal health care utilization in Varanasi, India is explored in Bloom et al (2001). The study is based on primary survey and found that autonomy is as important as other conventional variables. This paper is a good reference for the construction of women's autonomy index. The case of Nepal for similar outcome variable is discussed in Suwal (2001), and Adhikari (2011). Dealing with Indian story Grabowski et al (2013) examined if mother's autonomy can ensure high quality of child health care, and whether it is able to reduce gender biasness in demanding child health care services. Their study covers only Bihar and Uttar Pradesh of India. Again Shroff et al (2011) used a cross-sectional base line data of 600 mother-infant pairs of Andhra Pradesh, India to determine the role of autonomy in feeding practice and infant growth. Bhargava et al (2011), interestingly, using the same data set that we use here, tried to look at various covariates of height, weight and haemoglobin concentration taking into consideration the aspect

of potential endogeneity. Navaneetham et al (2002) used data from the earlier round of the same survey to check various socioeconomic factors behind maternal health care service utilization in some southern states of India, whereas Chakrabarti (2012) focused only on rural India. Roy et al (2008) used a different survey data to explore if there is any gender difference in health care utilization in India. Agha (2000) examined the case of Pakistan. Lastly, though Sarkar et al (2014a, 2014b) did not attempt to emphasize the issues of maternal health care services directly, it used the latest data on India that help us to have a brief overview of such issues at the national level.[2] So it is apparent that none of the papers use data on West Bengal, a state of Eastern India to check the health care utilization behavior and their determinants. So to fill up the caveat here we focus on the demand for maternal health care inputs in West Bengal. Striking absence of West Bengal as the area of analysis naturally evokes some doubts and raises questions why researchers are reluctant. Primarily this phenomenon instigated us to take up the case of West Bengal. Beside the historical importance of this state as a place of intellectuals who are governed by a stable coalition government for a couple of decades, it is characterized by the total population of around 9.13 crore, which is around 7.6% of the total population (121.02 crore) of the country. The growth rate of population in the state in the previous decade (1991-2001) was 17.8%, compared to 14.0% in 2001-2011, indicating further reduction of fertility. The birth rate and the death rate of the state as per SRS (Sample Registration System) 2009 was 17.2 (rural 19.1 and urban 12.1) and 6.2 (rural 6.1 and urban 6.4) respectively. Rank of West Bengal among different states of India in respect of child mortality rate deserves more attention along with reduction of infant mortality rate. Though maternal mortality rate of the state is better than most of the states, it is the only state where the rate increased over the period 2004-06 and 2007-09. Therefore, West Bengal must be an area to be analyzed with much curiosity.

Another distinguishing feature of this paper is the use of joint estimation technique which is not often used. The details of the technique and its relevance for such analysis are discussed later.

The rest of the paper is arranged as follows. Introduction is followed by a brief description of the data-source and methodology. IIIrd section presents results of our analysis and discussion. Concluding comments are placed in the last section.

2. Data and Methodology

We use data from a nationally representative survey in India-NFHS-3 (third round of National Family Health Survey, 2005-2006). The study was conducted in two phases from November 2005 to August 2006. It covers whole India and the questions are addressed to men of age 15-54 years, and both never and ever-married women of 15-49 years old. However, we consider only the ever-married group as given the social structure maternal health issues are associated with these women only. So, in a sense the study concentrates only on women of child

[2] I am thankful to the Referee for asking me to briefly discuss the basic results of the literature.

bearing age. Furthermore, in this paper we confine our analysis only for West Bengal. The primary reason for such a choice is lack of serious health research for this part of India. NFHS-3 gathered information for both PC and the choice of place of delivery for the youngest child who is born during five years preceding the survey. So we have a sample of 1823 mothers who have given birth of a baby during 2001-2005.

From descriptive statistics we find that two-third of the mothers belong to Hindu families whereas Muslim is 33.3% and Christians are only 1% of total population. Though wealth distribution is not very extreme, 23% of total population falls in the poorest category. On the other hand middle income group and richest group are of almost same proportions, 17%.[3] Out of 1823 mothers 83.6% belongs to 15-30 years age cohort; maximum (36.75%) mothers are educated in that they are either in the category of or completed secondary level. On the other hand 35.87% is illiterate and 21.23% is in the category of primary level. This indicates that a significant proportion of the girls move to secondary level if they start education. However, 73.61% mothers are not engaged in employment except own household chores. Apart from these we also have information regarding mothers' autonomy. We broadly categorize the autonomy issues into four indicators: access to information, role in the household decision making, whether she is allowed to move out or enjoys mobility, and if the mother can keep some money aside for her own use. Details of summary statistics are provided in Appendix A.

As we have argued before, maternal health inputs are very critical pathways in determining the health of the new-born baby, and these are largely determined by a set of socio-economic variables that are listed in a table format in Appendix A. These regressors are of some importance *a priori*. So drawing on Maitra (2004) and Maitra and Pal (2007) here we have two binary probits: place of delivery (hospital or not, denoted by HD[4]) and prenatal care (if taken or not, denoted by PC), where the final outcome variable is HD. So estimated equations take the following form:

$$PC = \alpha_0 + \alpha_1 X_p + u_p + \varepsilon_p \quad (1)$$

$$HD = \beta_0 + \beta_1 X_h + u_h + \varepsilon_h \quad (2)$$

Note that p and h subscripts define equations for prenatal care and hospital delivery, respectively, and α_0 and β_0 are the constant terms for the same. α_1 and β_1 are the coefficients for different regressors. X_p and X_h cover all possible covariates that may have predisposing effects on maternal health inputs. Therefore, the binary outcomes are represented as

[3] Note that definition of wealth index and standard of living are directly drawn from NFHS-3 or DHS (Demographic and Health Surveys) methodologies. We have just used the data classified by NFHS-3.

[4] HD includes private hospital, government hospital, NGO run hospital, and clinic.

$$PC = \begin{cases} 1 & if\ taken \\ 0 & otherwise \end{cases} \quad (3)$$

$$HD = \begin{cases} 1 & if\ delivery\ is\ done\ in\ hospital \\ 0 & otherwise \end{cases} \quad (4)$$

u_i $(i = p, h)$ is an error term supposed to take account of heterogeneity which is unobserved by nature i.e. due to mother. So $u_i \sim N(0, \sigma_i^2)$; σ_i^2 is the variance of unobserved factors, if any. Again ε captures other residual variation and follows $\varepsilon_i \sim IID\ N(0,1);\quad i = p, h.$[5]

Here it is imperative to talk about the source of heterogeneity in the structure developed. As hinted above there are certain factors or issues related only with the mother regarding anticipated complications during child delivery. These are absolutely private information to the mother but completely unobserved to the researchers or surveyors. Under this circumstance the concerned mother will self-select herself for the use of different health inputs. So it is a case of mother specific unobserved heterogeneity where PC is essentially endogenous in HD regression equation. The existing literature identifies two possible sources and types of self-selection bias: under estimating the effect when a pregnant women with relatively bad health select themselves for more prenatal care, and overestimating the effect when a healthier and educated woman again self-select for good quality care because of their knowledge about possible benefits of prenatal care.[6]

Also note that PC is also an important covariate for HD decision. Because PC not only defines medical assistance and attention, it also acts a counselling practice during pregnancy. So we expect that PC related medical advice helps women to decide about the safer and modern mode and place of delivery. Therefore, the system turns out to be a recursive one where we have to use joint estimation technique[7] or we will end up with biased estimation results.

3. Results and Discussions

In this segment we present regression results for those covariates only which we want to focus on (details can be found in Appendix B). To start with we have estimated two binary probit equations considering both PC and HD as exogenous. Then we have used a random effect estimation to check if unobserved heterogeneity is significant or it explains a reasonable percentage of variation in the regressand. Presence of potential endogeneity calls for jointly

[5] IID implies Independent and Identically Distributed random variables.

[6] I thank the Referee for clarifying why a brief explanation of the source(s) of unobserved heterogeneity need to be spelled out.

[7] Full set of covariates and detailed coefficients are shown in Appendix B

estimating both HD and PC equations which is done using Conditional Mixed Process (Roodman, 2009, 2013). Taking clue from Panis and Lillard (1994) we argue that such a recursive structure suffering from the problem of self-selection associated heterogeneity can be best estimated by jointly estimating full information maximum likelihood (FIML) method.[8] The mother specific unobserved heterogeneity in this set of equations is captured by ε_i. The value of ε_i is not known for any particular observation or mother, estimation can be performed by formulating likelihood conditional on ε_i, and then integrating over its distribution. This makes covariates x_i $(i = p, h)$ orthogonal to ε_i which, in effect, helps in producing consistent estimator. The entire set of issues is nicely handled in joint estimation technique we defined above.

Now we present the effects of concerned regressors for both exogenous (Model I) and endogenous (Model II) estimations along with the marginal effects. We start with the effects on PC though the final response variable is HD. We do so in order to argue in line of the service sought for.

3.A Demand for Prenatal Care (PC)

Presence of some sort of endogeneity is also apparent from the difference in the value of coefficient of regressors. If we look at the estimated co-efficients for different covariates it has been observed that exogenous estimation of co-efficients are either underestimated or overestimated. So the concerned effect should be assessed from endogenous estimation results (see Table-1).

Table-1
Demand for Prenatal Care (PC)

	Model-I		Model-II	
	Effect on prenatal care	Marginal Effects of respective covariates	Effect on prenatal care	Marginal Effects of respective covariates
Place of residence	0.701**	0.0580	0.351**	0.0596
	(2.61)		(2.68)	
Religion (ref. group Hindu)				
Muslim	-0.476*	-0.0424	-0.250*	-0.0425
	(-2.50)		(-2.46)	
Christian	-2.103***	-0.2046	-1.209***	-0.2057
	(-3.69)		(-3.42)	
Standard of Living (ref. group Low)				
Good	1.126**	0.0966	0.560**	0.0953
	(2.92)		(3.13)	
Very Good	1.355*	0.1195	0.688**	0.1171
	(2.41)		(2.73)	
Can keep money for own use	0.630**	0.0558	0.326**	0.0555
	(3.01)		(3.00)	

[8] Other methods of estimation like OLS, 2SLS etc. give us biased estimation since $Cov\ (x_i,\ \varepsilon_i) \neq 0$, and mother level unobserved heterogeneity is actually an omitted variable in the list of regressors.

Mother's education (ref. group Illiterate)				
Primary level	0.481*	0.0438	0.259*	0.0440
	(2.16)		(2.17)	
Secondary level	0.753**	0.0700	0.408**	0.0695
	(2.72)		(2.93)	
Birth order of the child	-0.123*	-0.0140	-0.0840*	-0.0142
	(-1.96)		(-2.33)	

t statistics in the parentheses; *, **, *** indicate significance at 10%, 5% and 1% level, respectively.

Urban women are almost 6% more likely than rural women to seek prenatal care. As PC largely depends on some supply side variables viz. availability of doctors, hospitals, modern medical facilities, physical proximity to PC, and infrastructural facilities to avail medical advice, place of residence turns out to be a strong predictor of PC both quantitatively and statistically. In general people living in urban area enjoy most of the facilities we mentioned, whereas rural women are deprived of such amenities[9]. At the same time level of education and standard of living, which are other significant covariates, are also relatively higher for urban residents. Probability of taking PC is 11% higher for those whose standard of living is very good compared to low standard of living. While, the same is 9% higher for those women who live families having good standard of living(ssli).[10] Ssli probably reflects the degree of awareness of family members and their responsiveness to modern amenities, be it social, religious, medical, cultural etc.

Again looking at the probability of seeking PC across different religion it has been found that Muslims and Christians are less likely than Hindus to get PC. Christians are 20% and Muslims are 4% less likely. This argument points at some religious beliefs, cultural hindrances, and distribution of educational attainment among mothers of different religions which may restrict them from availing modern treatment and advice. As far as Christians are concerned in most part of West Bengal majority of Christians belong to lower income group. So we cannot discount the role of standard of living that bears some reflection of wealth distribution that we explained above.

Though partner's education does not make much difference in utilizing PC, mother's education is very important. Expectedly, women with secondary level of education is almost 7% more likely to demand for PC than illiterate women. The same is 4% higher for primary educated women with reference to women with no education. Education influences the demand for PC as educated women enjoy relatively more freedom of movement to see doctors or to contact health

[9] Lack of availability of data on supply side variables associated with per capita medical professionals (including public and private) we could not check to what extent supply side variables actually affect PC. Nevertheless this kind of analysis is imperative as this may help policy makers to design proper programs to target services for those in greatest necessity.

[10] Standard of living (ssli) should not be confused with wealth distribution. Ssli covers more aspects than wealth. For detailed discussions on ssli and wealth readers are referred to check DHS reports (Rutstein, 2008).

workers. They are also more conscious of the complications and riskiness during pregnancy and in post-natal phase. In order to get rid of such unforeseen complications women demand for PC.

Birth order of the child reduces the probability of seeking PC advises marginally and it is significant at 90% confidence interval. Higher birth order implies that the concerned mother has got some previous experience of pregnancy and delivery as she had either given birth to at least one baby or had the experience of how to handle herself during pregnancy. Though this experience always may not be able to predict all undesired situation during pregnancy,, generally experienced mothers take care of the problems efficiently. So experience acts a confidence-booster. This is possibly why we observe a negative relation between birth order of the child and demand for PC. On the other hand more children may lead to resource crunch or may end up with less availability of time for PC because of many other competing demands

Interestingly, mothers are more inclined to using PC if they can keep some money aside that would be entirely controlled by her[11]. The likelihood is 5% higher compared to those who do not enjoy this advantage. Probably, women use such portion of family income for purchasing health inputs such as PC. Depending on these arguments we may have an impression that women's occupation and demand for health inputs are strongly correlated. But we have not found any such strong co-relation indicating the possibility of male-controlled family where entire income is either managed by the partner (or husband) or by other older member of the family.

3.B Demand for Hospital Delivery (HD)

In most of the developing countries like India, where child-birth is yet to be largely institutionalized[12], choice of place of delivery depends on a lot of socio-economic factors that we discussed in the preceding segment. Results and explanations are almost identical with that of PC with little exception that mother's age positively influences the demand for HD. Results are displayed in Table-2.

Table-2
Demand for Hospital Delivery (HD)

	Model-I		Model-II	
	Effect on hospital delivery	Marginal Effects of respective covariates	Effect on hospital delivery	Marginal Effects of respective covariates
Prenatal Care	1.357***	0.1706	0.284	
	(4.94)		(0.64)	

[11] This variable is a part of mother's autonomy indicators. Details of autonomy variables are found in the full set of covariates provided in Appendix. We have used Principal Component Analysis to find out the principal component(s) for each subgroups and then used them in the regression.

[12] Here we do not distinguish among public hospitals, private hospitals, NGO, trust or any other health institutions. Positive value of HD covers all institutions endowed with trained professionals.

Place of residence	1.801***	0.2464	1.044***	0.2521
	(9.88)		(10.15)	
Age of the mother	0.000916**	0.0001	0.000501**	0.0001
	(2.67)		(2.63)	
Religion (ref. group Hindu)				
Muslim	-1.006***	-0.1362	-0.582***	-0.1406
	(-6.77)		(-6.81)	
Standard of Living (ref. group Low)				
Good	1.161***	0.1667	0.731***	0.1764
	(5.04)		(5.46)	
Very Good	0.848**	0.1197	0.536**	0.1295
	(3.03)		(3.24)	
Access to Information	0.00989**	0.0013	0.00588**	0.0014
	(2.89)		(2.99)	
Say in household decision making	0.000823		0.000570	
	(0.19)		(0.21)	
Allowed to go	0.0174*	0.0023	0.00905	
	(2.18)		(1.84)	
Can keep money for own use	-0.170		-0.0750	
	(-1.12)		(-0.86)	
Complications during pregnancy	-0.478*	-0.0640	-0.269	
	(-1.99)		(-1.95)	
Mother's education (ref. group Illiterate)				
Primary level	0.503**	0.0684	0.304**	0.0733
	(2.75)		(2.91)	
Secondary level	0.976***	0.1374	0.595***	0.1437
	(5.17)		(5.38)	
Birth order of the child	-0.362***	-0.0454	-0.195***	-0.0471
	(-4.32)		(-4.44)	

t statistics in the parentheses; *, **, *** indicate significance at 10%, 5% and 1% level, respectively.

Though mother's age does not raise the probability of institutional child-birth by a significant proportion (0.01%), the positive effect can be intuitively explained. Possibly with age either pregnancy related complications leading to premature delivery or fatal consequence during delivery goes up or they become more conscious about probable complications associated with child-birth, and hence they prefer a safer mode of delivery under the supervision of trained personnel. This is not to be confused with the danger signs during pregnancy as there are some other physiological problems that become severe as expected date of delivery approaches. This is corroborated by the value of estimated coefficient for complication during pregnancy which is not significant at any level. Argument of awareness also leads to another significant covariates – access to information. Access to information is defined as whether the woman reads newspaper, listens to radio and watches television at least once a week. It is observed that if a woman has access to such informative channels, the likelihood of choosing the place of delivery as hospital goes up by 0.14%.

Quite consistent with the demand for PC, HD also goes up remarkably for urban women (25%), good ssli (17%), very good ssli (13%), woman with primary education (7%) and with secondary education (14%). Whereas Muslim women are 14% less likely to go for hospital delivery.

4. Conclusion

In this paper we attempted to determine the factors and/or pathways that significantly influence the demand for maternal health inputs – prenatal care and hospital delivery. In doing so we have taken resort of two binary probit for health inputs and used joint estimation technique. The prime reason for choosing joint estimation is the presence of endogeneity. It has been found in our analysis that place of residence, standard of living, and educational levels of women are those covariates that remarkably increase the demand for both the health inputs. Basic results give us a general impression that infrastructural facility, supply of health professionals, workers, educational attainment of women have to be emphasized on as standard of living, per se, cannot be raise in the short-run with sector-specific (health or education) plans only. At the same time standard of living largely depends on economic, infrastructural and educational achievements. So policy makers should focus on physical infrastructure development that reduces the hazards of accessing and availing health service and education, encouraging girls to pursue education and to make sure that the drop-out rates after primary level is reduced to a negligible level.

Appendices

Appendix A (Summary Statistics)

Total HH surveyed in WB is 6794. Out of this we have considered only those household where at least one child is born in five years preceding the survey. For our analysis we considered only the youngest child. So we ended up with 1823 households. Baseline characteristics of the selected variables for Households, Mothers, and Children from West Bengal, India: NFHS-3 (2005-2006) are given below

	Percentage (%)	Mean	SD
Household Characteristics (Sample size (N=1823 Observations))			
Place of residence	_		
Rural	58.8		
Urban	41.2		
Religion	_		
Hindu	65.33		
Muslim	33.3		
Christian	0.88		
Sikh	0.11		
Buddhist	0.05		
Jain	0.27		
Others	0.05		
Standard of living	_		
Low	32.2		
Medium	30.77		
Good	28.3		
Very Good	7.95		
Partner's education	_	1.3194	1.0068
No	28.69		
Primary	20.24		
Secondary	39.11		
Higher	10.53		
Partner's occupation	_		
No work	0.93		
Others	0.05		
Manual	38.67		
Agriculture, HH & Domestic	27.21		
Professional, Clerical, Service, Sales	33.13		
Mother's Characteristics			
Mother's age (in years)	_	25.544	5.35
15-30	83.6		
31-40	15.3		
41-50	1.1		
Mother's education	_	1.1317	0.9774
No	35.87		
Primary	21.23		
Secondary	36.75		
Higher	6.14		

Mother's occupation		_		
No work		73.61		
Others		_		
Manual		12.01		
Agriculture, HH & Domestic		8.5		
Professional, Clerical, Service, Sales		5.87		
Child's Characteristics				
Birth order of the child		_	2.35	1.6062
Prenatal care		_	0.2079	0.4059
No		11.68		
Yes		88.32		
Place of delivery		_	0.5458	0.498
Others		45.42		
Hospital		54.58		
Complications during pregnancy				
No		91.17		
Yes		8.83		
Autonomy (Mother Level Variables)				
Access to information				
Reading news paper	Otherwise	84.59		
	At least once	15.41		
Listening to radio	Otherwise	69.61		
	At least once	30.39		
Watching TV	Otherwise	48.93		
	At least once	51.07		
Decision making within the household				
Respondent's health care	Other	1.04		
	Someone else	4.06		
	Husband/partner alone	35.33		
	Respondent and other person	_		
	Respondent and husband/partner	28.91		
	Respondent alone	27.98		
HH large purchase	Other	4.66		
	Someone else	12.12		
	Husband/partner alone	46.74		
	Respondent and other person	_		
	Respondent and husband/partner	27.32		
	Respondent alone	6.47		
HH daily purchase	Other	4.44		
	Someone else	13.71		
	Husband/partner alone	36.75		
	Respondent and other person	_		
	Respondent and husband/partner	18.82		
	Respondent alone	23.59		
Visit to natal family	Other	3.24		
	Someone else	9.22		
	Husband/partner alone	39.99		

		Respondent and other person	_
		Respondent and husband/partner	32.53
		Respondent alone	12.34
		Other	0.99
		Husband has no earning	6.8
	Spending partner's income	Someone else	_
		Husband/partner alone	34.72
		Respondent and other person	_
		Respondent and husband/partner	47.94
		Respondent alone	6.69
Mobility			
	Allowed to go to market	Not at all	25.01
		With somebody	32.86
		Alone	42.13
	Allowed to go to the health facility	Not at all	3.84
		With somebody	46.85
		Alone	49.31
	Allowed to go outside the village/community	Not at all	11.3
		With somebody	52.39
		Alone	36.31
Money set aside for own use		No	61.44
		Yes	38.56

Appendix B

List of covariates and coefficients for both prenatal care and hospital delivery regression

Coefficient (Demand for health inputs, Prenatal Care)

	Model-I	Model-II
Place of residence	0.701**	0.351**
	(2.61)	(2.68)
Age of the mother	-0.000341	-0.000125
	(-1.00)	(-0.66)
Religion (ref. group Hindu)		
Muslim	-0.476*	-0.250*
	(-2.50)	(-2.46)
Christian	-2.103***	-1.209***
	(-3.69)	(-3.42)
Standard of Living (ref. group Low)		
Medium	0.369	0.209
	(1.74)	(1.86)
Good	1.126**	0.560**
	(2.92)	(3.13)
Very Good	1.355*	0.688**
	(2.41)	(2.73)
Partner's Occupation (ref. group No Work		
Manual	1.307	0.716
	(1.80)	(1.80)
Agriculture, Household, Domestic	0.989	0.530
	(1.36)	(1.33)
Professional, Clerical, Service, Sales	1.367	0.745
	(1.84)	(1.86)
Mother's Occupation (ref. group No Work)		
Manual	0.0452	0.0126
	(0.17)	(0.08)
Agriculture, Household, Domestic	0.00241	0.0165
	(0.01)	(0.11)
Professional, Clerical, Service, Sales	-0.407	-0.182
	(-1.01)	(-0.86)
Access to Information	0.00304	0.00154
	(0.60)	(0.61)
Say in household decision making	-0.0116	-0.00656
	(-1.79)	(-1.89)
Allowed to go	-0.00987	-0.00533

	(-0.98)	(-0.92)
Can keep money for own use	0.630**	0.326**
	(3.01)	(3.00)
Complications during pregnancy	-0.0904	-0.0688
	(-0.37)	(-0.49)
Mother's education (ref. group Illiterate)		
Primary level	0.481*	0.259*
	(2.16)	(2.17)
Secondary level	0.753**	0.408**
	(2.72)	(2.93)
Partner's education (ref. group Illiterate)		
Primary level	-0.133	-0.0793
	(-0.62)	(-0.68)
Secondary level	-0.238	-0.145
	(-1.05)	(-1.19)
Higher level	-0.547	-0.265
	(-0.96)	(-0.94)
Birth order of the child	-0.123*	-0.0840*
	(-1.96)	(-2.33)
Constant	0.0789	0.143
	(0.10)	(0.33)

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Coefficient (Demand for health inputs, Hospital Delivery)

	Model-I	Model-II
Prenatal Care	1.357***	0.284
	(4.94)	(0.64)
Place of residence	1.801***	1.044***
	(9.88)	(10.15)
Age of the mother	0.000916**	0.000501**
	(2.67)	(2.63)
Religion (ref. group Hindu)		
Muslim	-1.006***	-0.582***
	(-6.77)	(-6.81)
Christian	-0.503	-0.439
	(-0.54)	(-0.88)
Standard of Living (ref. group Low)		
Medium	0.0962	0.0785
	(0.55)	(0.77)
Good	1.161***	0.731***
	(5.04)	(5.46)
Very Good	0.848**	0.536**
	(3.03)	(3.24)
Partner's Occupation (ref. group No Work		
Manual	0.842	0.573
	(1.08)	(1.36)
Agriculture, Household, Domestic	0.769	0.510
	(0.98)	(1.20)
Professional, Clerical, Service, Sales	0.999	0.641
	(1.28)	(1.52)
Mother's Occupation (ref. group No Work)		
Manual	-0.128	-0.0673
	(-0.54)	(-0.52)
Agriculture, Household, Domestic	-0.345	-0.215
	(-1.35)	(-1.46)
Professional, Clerical, Service, Sales	0.110	0.0527
	(0.33)	(0.28)
Access to Information	0.00989**	0.00588**
	(2.89)	(2.99)
Say in household decision making	0.000823	0.000570
	(0.19)	(0.21)
Allowed to go	0.0174*	0.00905
	(2.18)	(1.84)
Can keep money for own use	-0.170	-0.0750
	(-1.12)	(-0.86)
Complications during pregnancy	-0.478*	-0.269
	(-1.99)	(-1.95)
Mother's education (ref. group Illiterate)		
Primary level	0.503**	0.304**
	(2.75)	(2.91)
Secondary level	0.976***	0.595***
	(5.17)	(5.38)
Partner's education (ref. group Illiterate)		
Primary level	0.175	0.0835
	(0.91)	(0.77)
Secondary level	0.103	0.0392
	(0.55)	(0.36)
Higher level	0.786	0.402
	(1.78)	(1.61)
Birth order of the child	-0.362***	-0.195***
	(-4.32)	(-4.44)
Constant	-2.759**	-1.283*
	(-3.25)	(-2.37)

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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