

Demand for Health Institution Delivery in Nepal: A Case Study Kanchanpur District

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Abstract

In Nepal more than 80 percent delivery takes place at home, many without the presence of skilled attendant. Children delivered at home are usually more likely to be delivered without assistance from a health professional, whereas children delivered at a health facility are more likely to be delivered by a trained health professional. In this context, this study analyzes the demand for health institution delivery in Kanchanpur district, Nepal, using logit model. Price elasticity of demand not only got positive sign but also very high value. It is found that childbirth leads to a considerable financial cost that is mostly borne by a household. Costs of delivery care and particularly complications, place an extremely heavy burden on household finances. Even for the women in highest wealth quintile cost of delivery care services represent 90 percent of their monthly cash income. The average cost of transportation for those delivering in health institution was Rs 677. In this regard government's maternity incentive program to provide the incentive of Rs 500 for those women delivering in the health institution is appropriate in reducing the financial burden to the households.

Introduction

Like other goods and services, the health care services are also not free. The cost has to be borne by the beneficiaries. This cost has two aspects: the cost of providing care and cost of obtaining care. The later, borne by the consumer, includes not only the fee charged but also the opportunity cost of time and cost of travel to the health facility. Thus even when fee is zero, the private cost is positive and can be quite large (Getler, 1989).

Half a million women die of pregnancy-related complications every year in the world. A large majority of these deaths occur in developing countries where fertility rates, even

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though falling, continue to be high and access to health care services is very low. Great strides have been made in increasing access to primary health care services and a large emphasis has been placed on preventive services such as Antenatal Care (ANC) check up. While this has had a large impact on reducing the burden of disease in general, its impact on maternal mortality remains constrained by the fact that screening (during ANC check up) is not very effective in predicting obstetric complications. For all practical purposes all pregnant women are at risk of serious obstetric complications, and so emergency obstetric care is important in lowering the maternal mortality.

There are generally two types of obstetric care. One is Basic Emergency Obstetric Care (BEOC) and the other is Comprehensive Emergency Obstetric Care (CEOC). The former deals with care of simple type of complications while the later deals with the more crucial cases which requires operative services as well. These two services differ in terms of the facilities needed to handle the complication as well as the training required for the health professionals. Obstetric care provided by trained professionals (doctors and midwives) and supported by a comprehensive hospital in the case of emergency during delivery is recognized as critical for the reduction of maternal and neonatal mortality.

The Millennium Development Goals (MDGs) specifies a two thirds reduction in the under-five mortality rate and 75 percent reduction in the maternal mortality ratio by the year 2015. In this regard Nepal has seen a remarkable improvement in maternal and neonatal health outcomes in recent years. Maternal mortality rates has declined from 539 deaths per 100000 live births to 281 deaths per 100000 live births in the past decade and over the same period neonatal mortality has declined by 34 percent, from 50 to 33 deaths per 1000 live births (NDHS,2006).

In Nepal more than 80 percent delivery takes place at home, many without the presence of skilled attendant. Children delivered at home are usually more likely to be delivered without assistance from a health professional, whereas children delivered at a health facility are more likely to be delivered by a trained health professional. The NDHS (2006) tried to find out the causes behind the overwhelming delivery of women without absence of the professional health workers. The survey result illustrates that vast majority of women (73 percent) believed that it was not necessary to give birth in a health facility, 17 percent mentioned that it was not customary, 10 percent said that it cost too much and nine percent cited that a health facility was too far or that there was no transportation to a health facility. In addition, three percent of women mentioned that the baby was born before they could actually get to the facility, even though they had planned to go to a health facility for delivery. In this scenario, this study analyzes the demand for health institution delivery in Kanchanpur district, Nepal.

Determinants of Demand

Financial cost plays an important role in the demand for healthcare in general and for maternity cares in particular (Borghini, 2004). Number of studies has estimated the household costs of obstetric care. These studies have focused mainly on the medical costs

incurred within facilities and in some case, transport cost. Little has been reported about costs incurred by those delivering at home.

Women's preferences for the characteristics of providers shape their demand. The fall in utilization of health institution based care seen after the introduction of user fees in several countries suggests maternal health services are sensitive to price (Borghgi and Ensor as quoted in Jackson, 2007). The official user fee, however, is only one of many cost items likely to influence demand. These costs include the pecuniary value of items such as transport, medicines, supplies, food, as well as the time cost incurred while travelling, waiting, and receiving care at the health facility. While user fees are not unimportant, the non-medical costs of delivery care can outweigh the official price charged by health providers. A growing body of evidence suggests that the costs of delivery care place a substantial economic burden on the household and serve to discourage use (Borghgi and Ensor as quoted in Jackson, 2007). Seemingly free delivery care in hospitals can involve substantial hidden costs, which delay care seeking and act as an important barrier to utilization, particularly among the poorest. (Nahar and Costello, 1998) There is great variation in the cost of different health care seeking options. The cost of complicated deliveries is between three and ten times greater than a normal delivery (Borghgi and Ensor as quoted in Jackson, 2007). Lack of access to money at the time of need has also been found to constrain service use at hospitals and delay decision making. (Nahar and Costello, 1998) Access to social networks can enable women to overcome some of the financial costs associated with seeking care (Jackson, 2007). Moreover, flexibility in the payment method, such as acceptance of gifts in kind and delayed payment has been shown to be an important consideration in the choice of providers. Traditional Birth Attendants providing delivery care at home, for example, can prove attractive for those requiring greater flexibility in the amount and means of payment than professional care services in facilities (Borghgi et al., 2004).

Distance and time costs are most important when the price of medical care is low or zero (Getler and Van, 1990). Family members often accompany the patient when seeking care inflating time costs even further (Sauerborn, 1995). Research findings in Nepal (Borghgi et al., 2004) confirm the negative impact of distance on the use of skilled attendance at delivery in health facilities. Other findings based on qualitative research methods also cite distance as a barrier to accessing maternity care (Nuwaha, 2000 and Phoxay et al., 2001 as quoted in Jackson, 2007). However, evidence suggests distance may no longer be a significant predictor of use when women have complications (Borghgi, 2004). It appears when women have severe complications and require CEOC services distance is much less of a deterrent.

Quality of care is expected to be of particular importance in maternal health because many preventive practices related to childbirth can prove to be dangerous when performed by unskilled providers. Poor perceived quality is an important variable in explaining provider choice and the observed practice of by-passing. Studies of women's views cite lack of drugs, supplies, and qualified staff, the attitude of health professionals

and cultural acceptability of services as common grievances and reasons for choosing to deliver at home (Chakrawarty, 2003).

The influence of characteristics of the individual on demand has been explored extensively, particularly through analysis of Demographic Health Survey data sets. Socio-economic status (SES) is found consistently to influence service use and choice of provider. Previous studies suggest that women of a higher SES are more likely to deliver in the presence of a skilled attendant in a health institution. These studies have relied upon proxy measures of SES, such as asset wealth, occupation, and education, rather than income and expenditure estimates, which are often regarded as unreliable (Deaton, 1997). Education is likely to not only proxy SES but also reflect multiple factors linked to assimilation of information, perceptions of need and the value attached to skilled delivery care (Furuta and Salway, 2006 as quoted in Jackson, 2007). Numerous other characteristics of the individual or household are shown to be associated with use of maternal health services. These include age, parity, ethnicity, caste, religion, marital status, residence (urban/rural), migration, household size, concern of the husband, autonomy of the woman, and past experiences of illness and contact with service providers (Jackson, 2007).

Table 1: Summary of the Determinants of Demand Emerging from Literatures

Determinants	Method	References
Cost	Quantitative	Afansa, 2004
Price, Transport time, type of practitioner, household assets, location, education, living children	Logistic Regression	Akin et al., 1985
Age, parity, education, income	Quantitative	Anson, 2004
Women's autonomy	Qualitative	Bloom et al., 2008
Cost, means of payment	Quantitative	Borghi et al., 2006
Cost	Quantitative	Borghi et al., 2003
Education, parity, insurance coverage, ethnicity, wealth, geography	Logistic Regression	Celik and Hotchkiss, 2000
Women's position in household	Logistic Regression	Furuta and Salway, 2006
Perceived need, costs, perceived quality, antenatal care, physical access	Qualitative	Griffiths and Stephenson, 2001
SES, cultural, age, parity, availability and access of service	Logistic regression	Magadi et al., 2000
Costs	Quantitative	Nahar and Costello, 1998
Access, SES	Logistic Regression	Rahman et al., 2007
Price, travel time, quality, income, education, mother age, electricity, insurance coverage, season	Logistic Regression	Schwartz et al., 1988
Distance, costs, quality, severity of illness, SES	Theoretical review	Thaddeus, et al., 2004

Source: Jackson, 2007.

Approaches to Studying Demand

There are number ways in which demand can be modeled, different authors have used different techniques to model the demand, and few of them are reviewed below.

For economists, the starting point in the analysis of the determinants of demand is the conventional demand function. Typically, this includes the good's own price, the price of related goods, income, consumer tastes, and other good-specific elements. (Samuelson as quoted in Jackson, 2007). There has been considerable focus on these determinants of demand in the health care literature. However, there are number of characteristics of delivery care that set it apart from other health services. Childbirth is not inherently pathological and for the majority of women, it is a positive, natural experience free from illness. For an unfortunate few at the other end of the spectrum, childbirth can lead to death. The risk of maternal conditions and the fact that they can be unpredictable, severe and prone to rapid escalation means women may require access to emergency obstetric services (Jackson, 2007). A balance must be struck between maintaining the normality of childbirth on the one hand and being prepared to manage complications should they present themselves on the other hand. Thus, the determinants of demand for delivery care may not match those for general health services.

Pokharel et al. (2005) does not modeled the demand for formal and informal care based on the maximization of household utility function, where utility is a function of health care price and other factors which include household income, characteristics of child etc. A simple logit is applied where dependent variable take the value one if the child received formal health care service otherwise it is zero.

As price being one of the independent variable and also assumed to be the major predictor of demand it includes total out of pocket costs (consultation and investigation fees paid to providers, drug costs and travel costs). The time price i.e. opportunity cost is not included as the survey from which author got the data did not had this information. Also the survey collected information on financial costs of only the chosen alternative. Hedonic price equation is used to impute prices for alternative not chosen by the individual.

In modeling demand the author has made distinction between conditional and unconditional variable. Conditional variable are characteristics of provider such as price, and therefore they vary across different choices. A challenge in modeling demand is obtaining price for the choice not chosen. In other words data are lacking on the relative prices of different providers faced by an individual. So to overcome such problem one of the technique is to use hedonic price equation. In the hedonic price equation, price is assumed to be a function of age, sex, type and seriousness of illness and market structure variables, such as location, population and availability of health care services (Pokharel et al., 2005). The regression coefficient is then used to predict the health care price for the entire individual.

One of the objectives of this paper was to estimate the price elasticity of demand for formal health care to find out the sensitivity of price in demand for formal health care. It is concluded by the author that price is a significant determinant of health care services for children in Nepal. However, the overall effect of price on utilization is inelastic. As authors observe "Our elasticity estimates are a little less than those found in other

settings. The possible cause of this dissonance could be the exclusion of time costs and use of different type of modeling" (Pokharel et al., 2005).

Getler and Van (1989) in their work used not only price but income as well in their demand model. They used the semi-trans log conditional utility function where the effect of price on the demand for medical care is allowed to differ by income level. As they argue models of demand for medical care in developing countries are mis-specified. The studies typically model demand as a discrete choice, with the price specified to be independent of income. This assumption is restrictive, since one would expect the wealthy to be less sensitive to price among providers than poor. They also provide evidence on the difficulty in modeling demand in the developing countries as there is often little or no variation in price within a country. They stated that "in many developing countries most medical services are run by governments, which set prices, close to or, in many cases, equal to zero. Even when prices are positive, they are typically uniform within the country". A second complication in modeling the demand for medical care is that the decision to use services is discrete. Individuals choose whether to visit a clinic, hospital, or private doctor or not to obtain care at all (that is, they treat themselves).

Study Site and Sampling Design

The study was conducted in the Kanchanpur district of Far Western Development Region. There are 20 VDCs and one municipality. District lies in the Terai region and shares border with India. The district is situated in the tropical climatic zone at a low altitude. As of the Village Development Committee Profile prepared by Intensive Study and Research Center (ISRC) in 2008, the total population of the district is 377,899 of which the proportion of the women is about 51 percent. District has one zonal hospital situated in Mahendranagar Municipality, three PHCC, eight health posts and ten sub health posts. 775 deliveries were conducted by trained traditional birth attendant (ISRC, 2008).

The study deliberately determined 120 samples to be collected from one municipality and three VDCs due to the time and resource constraint. Since there is only one municipality in Kanchanpur district no sampling is done for urban area. However, three VDCs were selected randomly. Thus 30 samples from each VDC/municipality were interviewed.

At first stage a ward of the VDC/municipality is selected randomly. The tentative list of the women who delivered 6 months prior to the study is prepared in consultation with the FCHV of the respective ward. Systematic sampling is then conducted to determine the interval with population (N) being the number of eligible women in the list and sample size (n) being 30. Again simple random sampling is done to determine the first women to be interviewed. If 30 samples are not accomplished in selected ward, same procedure is repeated in the adjoining ward.

Theoretical / Economic Model

It is assumed that women make decisions about whether to seek care for themselves based on the maximization of household utility function as used by Getler (1989).

Let us define a household's utility function as

$$U = U(D, X, L) \text{-----(1)}$$

Where,

D=Delivery care, X=other commodities, L=Leisure

Again let us define the household's budget constraint as

$$Y = Y^* + w(T-L) = P_D D + P_X X \text{-----(2)}$$

Where, Y^* = Non labor income, w =wage rate, T =Total time for work, P_D =Price of delivery care, P_X = Price of other commodities.

Here households maximize the utility function subject to budget constraint choosing L, D and X. following Lagrange's multiplier, first order condition yields following demand function for Delivery care and other commodities being dependent on individual's allocation of (Y^*) and labor income between delivery care and other commodities.

$$D = D(Y, P_D, P_X) \text{-----(3)}$$

$$X = X(Y, P_D, P_X)$$

Substituting equation 3 in 1, we get indirect utility function as follow

$$U^* = U^*(Y, P_D, P_X) \text{-----(4)}$$

Since we are concern with the price of delivery care only we ignore price of other commodities and income. Also by adding the other covariates we can transform the equation 4 as

$$U^* = U^*(P_D, Z) \text{-----(5)}$$

Where Z = other covariates such as age, mothers education ethnicity parity etc.

If we consider U^* as a linear function of delivery care price and other covariates we can write

$$U^* = \pi P_D + \theta Z + \epsilon \text{-----(6)}$$

Where

π, θ are parameters to be estimated and ϵ is the specification error.

If U_0^* & U_1^* are the utility associated with the hospital and home delivery respectively then household choose to seek delivery if $U_1^* > U_0^*$ -----(7)

Empirically a logit model can be used to describe the expression (7)

Econometric Model / Logistic Regression

In order to know whether a household use hospital delivery or not given the price and other relevant variables, this study used logit model following Pokharel (2007). There are several ways of modeling demand because we wanted to model the choice to use hospital delivery as opposed to its non use, using a simple logit define below will suffice. The logit model can be specified as follow:

$$\begin{aligned} \text{Prob}_{\text{Hospital}} &= \text{Probability (Hospital delivery is chosen then 1 otherwise 0)} \\ &= \text{Probability } (U_1^* > U_0^*) \\ &= \text{Probability } (\pi P_D + \theta X + \epsilon > 0) \\ &= \frac{e(\pi P_D + \theta X)}{1 + e(\pi P_D + \theta X)} \end{aligned}$$

Price Elasticity of Demand

If price enters the utility function in log linear form, following Pokharel (2007), the point price elasticity is given by:

$E_p = \pi (1 - \text{prob}_{\text{health institution}})$. Where, π = Estimated coefficient of natural log of price.

E_p indicates how the demand for health institution delivery changes in response to increases in price.

Variables Used in the Study

The dependent variables take the value 1 if woman delivered in health institution otherwise it is zero. Health institution includes district hospital, primary health care center, health post, sub health post and private hospital.

Table 2: Independent Variable with Anticipated Signs

Variable	Description	Anticipated Sign of the coefficient
Price	Price is measured as total expenditure (registration fees, fees to provider, drugs cost, travel cost and opportunity cost)	-
Age of the woman	Age in completed in years	+
Mothers Education	0 if no formal education 1 if had formal education	+
Wealth quintile	5 quintiles of household wealth index	+
Parity	0 if delivering first baby 1 if delivering more than one baby	-
Ethnicity	Brahmin (e1) Janajati (e2) Dalit (e3)	+

Empirical Results and Discussion

This section attempts to statistically confirm the significance of various observations made in above sections in determining the place of the delivery, by running a logit regression. Place of the delivery would depend on the household's personal characteristics such as education level of mother, parity condition age of delivering women.

Table 3: Logit Regression Results (Institutional Delivery as Dependent Variable)

Independent Variables	Coefficient	Std. Err.	z
Cost of delivery	2.259441	0.7395377	3.06*
Mothers Age	0.0175902	0.0815581	0.22
Mothers Education	0.5181289	0.6787387	0.76
Parity Condition	-0.349182	0.7145776	-0.49
Ethnicity (e1)	0.1024942	0.9787151	0.10
Ethnicity (e2)	0.6007257	0.9081653	0.66
Wealth Quintile (q2)	0.3086465	1.075504	0.29
Wealth Quintile (q3)	0.6590698	1.106501	0.60
Wealth Quintile (q4)	1.758434	1.067882	1.65***
Wealth Quintile (q5)	2.764349	1.279887	2.16**
Constant	-18.33668	5.590878	-3.28*
<i>Number of observations</i>			103
<i>LR chi2(10)</i>			54.44
<i>Prob > chi2</i>			0.0000
<i>Pseudo R2</i>			0.4084
<i>Log likelihood</i>			-39.433575

Source: Field Survey: 2008.

- * Significant at less than 1 percent
- ** Significant at less than 5 percent
- *** Significant at less than 10 percent

Table 3 shows the regression results of logit model used for the study to know the determinants of place of delivery. Dependent variable is the place of delivery (1 if delivered in health institution, 0 otherwise) whereas cost of delivery along with various socio-economic variables are used as explanatory variables. The dummy of formal and informal education of mother and parity condition is used. Also, the study has used dummy variables of wealth quintiles and ethnicity.

The results from the logit analysis indicate that among various determinants of demand price, wealth quintile (4) and wealth quintile (5) are found to be significant. Price is positively related to the place of delivery. Wealth quintile four and wealth quintile five is significantly and positively related to the place of the delivery.

Cost of delivery is positively related to the place of the delivery, it indicates that as price rise people are more likely to go to the health institution for delivery which is conflicting to literature and the prior anticipated sign of the coefficient. Wealth quintile (4) and (5) are positively and significantly related to the place of the delivery. Wealthy people are more likely to go to the health institution for delivery and it is consistent in terms of anticipated sign of the coefficient. The other determinants of demand such as mothers' age, mother's education, parity condition, ethnicity (1), ethnicity (2) and wealth quintile (2), (3) are not statistically significant but consistent with our anticipated sign of the coefficient. Mother's age is positively related to the place of the delivery. Senior women are more likely to go to the health institution for delivery it may be because of the precaution for the possible complication during delivery at old age.

Mother's education is also positively related to the place of the delivery. There is a high chance of formally educated women going to health institution for delivery. It is assumed that formally educated women are more aware for the safety of themselves and their babies than not formally educated women. Parity condition is negatively related to the place of the delivery. Women are less willing to go to the health institution for delivery as they keep on delivering number of babies. Ethnicity (e_1) and (e_2) are positively related to the place. Brahmin, Chhetri, Thakuri and Tharu are more likely to go to the health institution.

Price Elasticity of Demand: $E_p = 11.96$. One percent increase in price would increase the demand for delivery in health institution by 11.96 percent.

Paradoxical Results: The sign of price elasticity of demand is opposite to the anticipated sign; the possible reasons for this paradoxical result could be followings:

1) As price was assumed conditional variable it vary across home and health institution. This study used the price for the chosen option only. In other words hedonic price equation was not used to impute the price of the alternative that women did not choose, but using hedonic price equation is beyond the scope of this study.

2) Sampling bias.

3) Women are ready to pay higher amount of money for better service.

Conclusion and Recommendation

Logit regression was run to estimate the price elasticity of demand but the result showed only few variables as statistically significant determinants of demand. Price elasticity of demand not only got positive sign but also very high value. This may be because of various limitations imposed in modeling the demand.

The survey of recently delivered women suggests that childbirth leads to a considerable financial cost that is mostly borne by a household. Costs of delivery care and particularly complications, place an extremely heavy burden on household finances. Even

for the women in highest wealth quintile cost of delivery care services represent 90 percent of their monthly cash income.

The average cost of transportation for those delivering in health institution was Rs 677. In this regard government's maternity incentive program to provide the incentive of Rs 500 for those women delivering in the health institution is appropriate in reducing the financial burden to the households. This scheme could act as a safety net against catastrophic payments; this may be an interesting topic for further study.

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