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Determinants of Maternal Health Care Utilisation in India: Evidence from a Recent Household Survey

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ABSTRACT

In India, utilisation of basic health services has remained poor. The reasons may be low levels of household income, high illiteracy and ignorance, and a host of traditional factors. In this paper an attempt is made to discuss the issues associated with the demand and supply of the five measures of maternity care-antenatal care, blood pressure check up, place of delivery, use of trained help at the time of delivery and postnatal care. Econometric analysis is undertaken to find out the determinants of the use of reproductive health care services among rural Indian households. Rural data from 32,000 households belonging to 1765 villages across all parts of India was collected by National Council of Applied Economic Research in 1994. The multi-model survey was conducted both at the national and state level. The analysis pertains to 7635 women in the reproductive age group who delivered a child in the year before the survey. The focus on the role of education, information and economic factors as determinants of health care accessibility and their utilisation is the speciality of this analysis. Analysis shows that education and information variables significantly increase the utilisation rates for prenatal, child delivery and postnatal health care. Women with primary education are more likely to use maternal health services as compared to illiterate women, even after controlling for income and health care supply factors. Exposure to media increases the probability of reproductive health care utilisation. Economic factors such as wages and income are important only for the utilisation of child delivery services. Access to locally available health services significantly increases maternity care use. An important health care facility in this respect has been the village level ICDS centre. Further, probit regressions analysis is used to examine the impact of individual, household and community level variables on the above choices of reproductive health care.

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1. INTRODUCTION

In most developing countries, such as India, utilisation of basic health services has remained poor even though there has been increasing public and private expenditure on the provision of advanced health care. The low utilisation seems to be due to low levels of household income, high illiteracy and ignorance, and a host of traditional factors. On the other hand, despite substantial public investments in health infrastructure the supply of such services continues to be inadequate and of poor quality. In addition, several inefficiencies such as an over emphasis on secondary and tertiary hospital care, skewed distribution of health services favouring urban areas (Nayler et al., 1999) and gender discrimination in access to health care are all pervasive (Shariff, 1999). Recent years have seen a rapid expansion of those health care services that have large private but low social returns. There has also been an excessive reliance on physicians rather than paramedics in the health care delivery mechanisms.

These weaknesses of the health care system have also affected the provision of reproductive health especially of the natal-mother and childcare. In addition, the public policy in this area has focussed on the use of contraceptives and has failed to address other reproductive health needs of women. The existing literature on the use of reproductive health services has focused on the effectiveness of various family planning methods, while studies pertaining to the accessibility and use of services for the management of pregnancy and childbirth are rare. As is well known, the health of the foetus or the newborn child affects its survival and growth over the whole lifetime. In addition, as maternal health is important in itself and for the health of the children, appropriate care is needed for the mother, both before and after the delivery. In India over 50 per cent of the children born are reported to have low birth weights with a very low probability of survival in the first year (Measham and Chatterjee, 1999). Given the high incidence of prenatal, neonatal and infant mortality in India, an analysis of the utilisation of reproductive health care services and their determinants becomes important.

This paper discusses the issues associated with the demand and supply of maternal health care services and provides an econometric analysis of the determinants of the use of reproductive health care services associated with pregnancy and child delivery by women in rural Indian households. Maternal health care services fall into three broad categories — prenatal care, health care during child delivery and postnatal care. High rates of maternal

mortality associated with childbirth and high infant mortality are observed in rural India along with low rates of antenatal and postnatal care utilisation. In addition, the use of these services varies considerably across socio-economic groups and geographical regions. These variations exist partly due to differences in health seeking behaviour across the groups, determined by economic, social and cultural factors and partly due to differences in access to health care facilities.

In the developing economies, especially those that are large and diverse, many studies have pointed out important benefits accruing from providing basic education and information through mass media in terms of improvement in a number of human development parameters. This paper focuses on the role of education, information and economic factors in the use of selected reproductive health care services as well as the effect of health care accessibility on their utilisation. Research on health outcomes has shown the significant positive effect of information and education on health care use and health outcomes. The following analysis shows that education and information variables significantly increase the utilisation rates of prenatal, child delivery and postnatal health care. Women with primary education are, on an average, 10 per cent more likely to use maternal health services relative to illiterate women, even after controlling for income and health care supply factors. Exposure to media, such as, radio, television or the printed media, increases the probability of reproductive health care utilisation by about 4 per cent.

Given that education, information and health care access variables are important, policy measures should be designed along these lines to lessen the inequalities in the health care usage that are created by the existing wealth and income disparities. Policy initiatives to increase female education, improved mass media, especially with higher content of health related information, would lead to substantial improvements in maternity care utilisation. The significant effect of access to basic health care services at the village level, especially from an institution such as an Anganwadi, indicates that greater effort should be made towards expanding this system and improving its efficacy. Since women in rural India often cannot travel beyond the sphere of their daily activities, accessibility in terms of physical distance and time flexibility should be the objective of local health care and outreach programs.

The remainder of the paper is organized as follows. A brief description of the organisation of reproductive health care services in India is presented in Section 2 followed

by a description of the data and basic statistics in Section 3. Section 4 presents and discusses the results from the empirical exercise. The last section concludes the paper.

2. REPRODUCTIVE HEALTH SERVICES

There exists a large network of institutions in the country for the delivery of health and family welfare services at the community and higher levels set up by the state and national governments. Although the emphasis has been on the family planning aspect of the reproductive health services, the existing health care network provides other kinds of maternity care services that are analysed in this paper. The majority of these services are provided at the community level through various types of health workers (Figure 1). As a part of the outreach program of delivery of health care services, there are female multi-purpose workers stationed at health sub-centres that cater to a group of contiguous villages. However, *Dai*s (midwives) and *Anganwadi* workers are expected to be present in each village *Anganwadi* covering a population of about a thousand. *Anganwadi* is a village-level childcare centre set up under the Integrated Child Development Services program (ICDS). It provides advice, information and basic health services for pregnant women, mothers and young children. It has basic physical infrastructure and some training and skills in basic health care. However, their presence in the village, their ability to build one-to-one relationship with the women in villages and their ability to make home visits gives them an advantage over both the formal health care delivery system and the traditional health care practices that are still prevalent in India.

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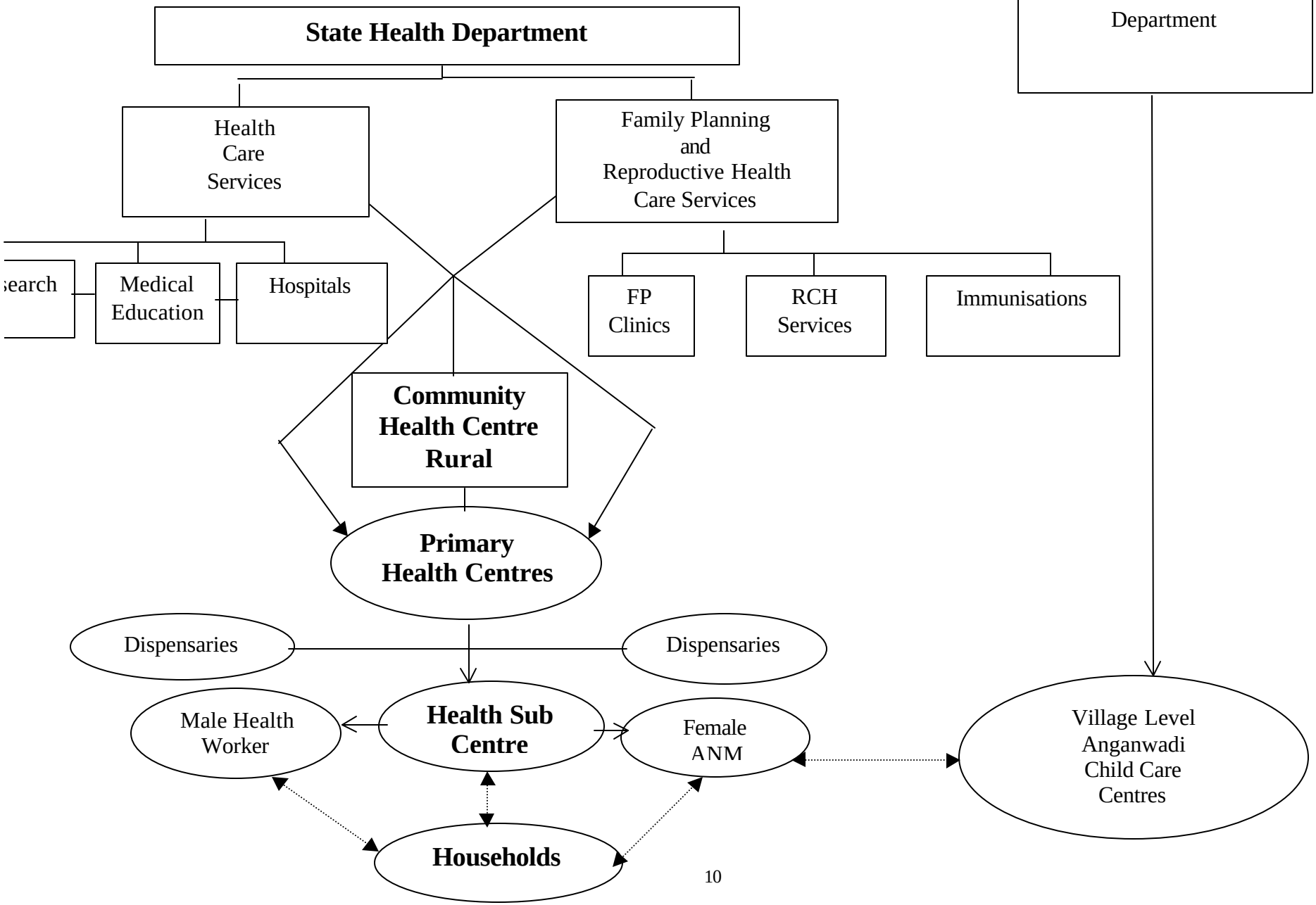
Fig. 1: Structure of Delivery of Health Care Services in India



Community level facilities provided by the health department and the department of woman and child welfare provide education and counseling on appropriate prenatal and postnatal health care such as mother and child nutrition, need for rest and exercise, etc. They also try to detect early danger signals and arrange for referral and help at the next level. The primary and other higher level health care facilities provide immunisation services, detection and referral for high risk factors and complications.

In the delivery of services, the community level help takes the form of conducting aseptic deliveries with basic kits provided to the village level trained workers and providing basic care like resuscitation for asphyxiated new born. In situations of a complicated delivery, these workers refer the case to a higher order mostly from the Primary Health Centre or the Community Health Centre in the rural areas. The workers at the health sub-centre supervise home delivery, provide treatment for infections and deliver mother and child immunisations. The paper analyses three aspects of maternity care services — antenatal care, intra-natal or child delivery and postnatal care that are described below.

Antenatal Care (ANC) and Postnatal Care (PNC)

Antenatal services are part of the primary health care services for pregnant women and management of the foetus. In India ANC services consist of a set of professional pregnancy checkups, tetanus and other immunisations, prophylaxis through iron and folic acid tablets, blood pressure check up and advice and information regarding delivery methods and services, nutrition and postnatal care. Although ANC services are also available in the private sector, the government has been the largest (over 90 per cent) supplier of ANC in rural areas. The main source of ANC is a network of health centres throughout the country, each serving a population of three to five thousand. These are staffed by trained personnel (Auxiliary nurse midwife - ANM) who provide prenatal and postnatal care at the centre, make home visits for pregnant women, help in child delivery and provide immunisation services to the infants. This program has been in place since the late 1950s and has grown rapidly since then, in both coverage and services. However, the efficiency in the delivery of these services leaves much to be desired in a number of states such as Bihar, Uttar Pradesh, Madhya Pradesh, Orissa, etc. due to vacancies, infrequent home visits, low quality services and corruption.

Postnatal care has a stronger element of hospital level care relative to antenatal care that is more focussed on information and other basic services. Treatment of complications

that might have occurred during the delivery, severe health condition of the new born, etc. are some of the PNC services that require skilled personnel and hospital facilities. The PNC services provided at the community level include counseling on family planning, breast feeding practices, nutrition, management of neo-natal hypothermia, early detection of postpartum complications and referral for such problems. The higher-level health care facilities are intended to provide these services as well as take care of post delivery complications.

Health Care Services for Child Delivery

There are two aspects of the delivery services that are considered in this analysis — whether the delivery was at home or at a health care facility and whether a trained person was present to assist in the delivery. Social norms in rural areas are such that home delivery is preferred to institutional deliveries. This in itself is not a problem if hygienic and appropriate delivery practices are used either by traditional helpers or by a professionally trained person who makes home visits for helping with the delivery. Hence the government has set up a system in which some village women, often the traditional midwives or *dai*s, are given basic training for child delivery. They are trained to deliver babies in a clean and proper way to avoid infections and other complications. This has ensured that a large percentage of rural women have access to trained help even for home deliveries.

Institutional Issues

In India a range of cultural factors influence the pregnancy, childbirth and childcare practices (Jeffery et al., 1988; Shariff, 1993). A woman's role in the family and community is one of subordination, deference and sacrifice that are the traits of patriarchy across all parts of India. Morbidity and health treatment — both associated with maternity and otherwise — are more a gender issue rather than merely issues of demand and supply. Pregnancy is looked upon as a condition that does not require medical attention (Jefferey et al., 1988). To quote Jefferey et al., "In addition to home remedies, various practitioners (government and private) are available, but none is engaged in any substantial outreach or systematic surveillance of the local populace for any condition, including pregnancy. "

Quality of Health (Reproductive) Services

The network of government services in India is very large but the quality of these services leaves much to be desired. Although there is a large and thriving private health sector in

India, the primary health and reproductive health care needs of the masses, especially in rural areas, are expected to be provided by the public facilities, mostly run by the state governments. However, due to various inefficiencies in the public health care delivery system, even the minimum facilities are not often made available to the target groups in the population.

In theory, the ANM should give pregnant women regular medical check-ups, distribute iron and folic acid tablets (to combat anemia, which is presumed universal), give a course of free injections of tetanus toxoid (to avert neonatal tetanus caused by cutting the cord with an infected instrument), identify women at risk and assist in their deliveries or refer them to the government hospital. The ANM should maintain a network of dais, usually those she has helped to train, to identify pregnant women and register them with her. But in practice most dais are not trained. Trained and untrained dais alike, seldom establish contact with pregnant women and do not systematically deliver medical care to them. At the same time, village women rarely consult dais during pregnancy. Most dais claim that they have no treatments or medicines to administer so that women have no reason to bring their troubles to them. Thus dais cannot provide a comprehensive safety net of medical care for pregnant women.

The government antenatal services do not function well even in larger villages and towns that have an ANM clinic in the government dispensary. Tetanus toxoide injections are a telling example. Women recognize that tetanus is a major threat to newborn babies, though they are uncertain about its cause or how to prevent it. Village women are commonly said to fear that tetanus toxoid injections (which are considered *garam*) might cause premature labour, especially as they are given towards the end of pregnancy (Jefferey, 1998, p.86). Women at risk are rarely referred to a specialist's care. The ANM may send them to the Primary Health Centre (PHC) but there is no appointment system, nor does the ANM accompany the woman.

On the one hand, cultural practices deter pregnant women from seeking ANC, natal and PNC services. On the other hand, these services are not available even when sought and if available are charged for on the sly leading to an explicit cost for the poorer households. The delivery services received either at health sub-centres or at home have exorbitant illegal

charges. Often the PNC services that require medication and treatment for lactating women are denied to those who cannot pay.

The local primary health care centres and sub-centres are expected to provide most of the ANC and PNC services free of cost and often at home. Although there is no explicit price for most of these services, there is always an implicit price in the form of opportunity cost of the time spent in availing health care facilities and services. Greater the distance to the healthcare facility, higher the implicit price of the service. Thus physical accessibility imposes another cost on the consumer, in addition to the illegal charges, for using a health care system that is supposed to be almost free.

The demand related constraints originating from cultural practices and accessibility factors, and the supply side constraints thus get reflected in the low overall rates of reproductive health care utilisation in India. However, these averages hide considerable variation in utilisation rates across different demographic groups and geographical regions of the country. The next section examines the individual level data on reproductive healthcare use to investigate this variation across groups and regions of the country.

3. DATA AND METHODOLOGY

The analysis in this paper uses data from the cross-sectional rural household survey conducted by the National Council of Applied Economic Research in 1994 to prepare a human development profile for India and its many states according to a number of demographic groups (Sharrif, 1999). A two stage stratified sampling design was used to sample about 32,000 families from 1765 villages across all parts of India. Household level information such as income, assets, family demographics, etc. was collected along with detailed information on the education and health of each family member. The health segment of the dataset includes data on the reproductive health of adult women, the health of all infants and details on the short and long-term morbidity of each family member. The following analysis will use data on 7000 odd women in the reproductive age group who delivered a child in the year before the survey.

The dimensions of reproductive health care considered in this paper are general ANC use, blood pressure checkups, choice of home delivery versus institutional delivery, use of professional help at the time of the delivery and finally the use of postnatal care. Although the dataset has information on two other components of ANC — iron tablet intake and tetanus toxoid injections, we only use blood pressure checkups since this is a service that has been introduced relatively recently in the ANC package.

As with the consumption of other goods, consumption of health services is a function of demand and supply side factors. On the demand side, an important assumption for this analysis is that the fertility decision is predetermined. Thus, the demand for and consumption of reproductive health services is conditional on the decision to have a child. This demand is determined by the preference of the family for the health of the mother and unborn/born child among other things. The standard utility maximisation framework can be used to model the demand. The family maximises a household utility function subject to the household budget constraint and the individual's health production function. In this context the utility function is a function of household consumption of different commodities such as leisure and the health of its members, in particular the health of the expectant mother and the unborn child. These preferences are in turn determined by individual and family demographics such as age of the woman, education of the woman and her husband, number of children, number of adult family members and so on. The health production function depends on the past health of the

woman and preventive and curative health care use. These factors interact with the wages, prices of different goods including health care and income from the budget constraint to determine the demand for the reproductive health services. Several papers have presented a detailed model of this approach.

As mentioned earlier although most of the ANC and PNC services are free of cost there is an implicit price associated with utilisation of reproductive health services. This is the opportunity cost of time spent on obtaining these services. It is equal to the wage rate for the woman if she is in the labour force or the value of her time if she works at home. Thus, both current own wages and current wages of other members (family income) should be significant determinants of the demand for such services. Other services such as delivery at a health care facility or trained help at the time of the delivery, although not explicitly priced, have substantial direct expenditures. In these cases, household income and thus current wages of all other family members become important determinants of health care demand. However, we do not expect current own wage effect for the woman since, by the time of the delivery the woman should be out of the labour force. Past wages of the woman could still affect the demand of these services through a wealth (accumulated saving) effect in the current period.

On the supply side, we assume that the location decision for the family is not influenced by the availability of reproductive health care facilities. In practice, it is often observed that a woman stays with her parents or parents-in-law, both for better home care during and after pregnancy and access to better health care. However, for the purpose of this analysis we will consider the supply of such services to be exogenous.

The health care measures are defined as binary variables that take the value one for the use of the service. Given the categorical nature of the reproductive health care variables, probit regressions are used to examine the impact of individual, household and community level variables on the above choices of reproductive health care. Unfortunately, we do not have information on the price or quality of these services. The distance to health facilities and wages are used as crude measures of the cost of acquiring these services. The analysis estimates a reduced form utilisation equation where the coefficients are measures of correlation and not necessarily causation. In addition, statements about substitutes and complements are conditional on the specification of the underlying household preferences and the health production functions for the mother and the child.

The individual level variables considered in the analysis are the woman's age and education, the number of children and her work status. Since we do not have information on past health status, education and wealth are used as proxies in the reduced form specification. Ideally wages of all members of the household should be included as explanatory variables to account for the implicit own and cross price effects associated with the opportunity cost of time. However, due to data limitations explained later we only use average male and female wages.

At the household level per capita income, land assets, number of adult females, husband's education, caste and religion are included as explanatory variables. Woman's accessibility and exposure to information through media sources such as the radio, television and newspapers and magazines is another household level variable. These are defined as binary variables that take the value of one if any woman in the household frequently listens to the radio, watches television or reads newspapers or magazines. The variable thus captures the effect of the information exposure of women not just the mother. The supply side variables and dummy variables for accessibility to hospital and health care service and the indicators for the presence of an ICDS childcare in the village are listed in Table 1, which provides detailed definition of the variables used in the analysis.

The analysis provides two specifications for the basic regressions. In the first specification household income is included as an explanatory variable. However family income is jointly determined with time allocation of family members and the consumption of health care by different individuals. To correct for the endogeneity of income we use predicted per capita income in the first specification. The set of instruments used are physical capital such as land owned, ownership of farm machinery and irrigation sources; human capital in the form of adult male and females in the household, rental income, agricultural wages along with household demographics and state controls. However when we use a predicted right hand side variable in a probit the standard error estimates are biased giving incorrect t-statistics for hypothesis testing. We use bootstrapped standard errors instead to correct this problem in the first specification. In the second specification and all subsequent expanded regressions these proxies for family income and wealth are entered directly.

Table 2 presents some basic statistics from the data. Of the 37,649 currently married women in the reproductive age group, 20 per cent delivered a child in the year before the survey. The proportion of mothers who delivered a child has been higher in the states of Rajasthan, Bihar and Uttar Pradesh. Of the total 7635 women, 61 per cent used some form of ANC – 33 per cent got regular blood pressure check ups, 10 per cent used iron prophylaxis and 19 per cent got tetanus immunisations. Although we have information on iron intake and immunisations, it is less reliable than the general measure of ANC use. Thus, the empirical analysis only uses blood pressure check ups and ANC use as the two measures for antenatal care.

A very large majority (75 per cent) of these deliveries occurred at home and only 52 per cent used some trained help at the time of delivery. The PNC use is only 26 per cent in this sample. The women who used ANC were also much more likely to use other health care services, for example, 37 per cent of the women who used ANC also used PNC. However, only 7 per cent of the non-ANC users used PNC.

These simple averages hide considerable variation across socio-economic groups and regions with very different supply of reproductive health services that are discussed in an earlier section. About 64 per cent of the women in this subgroup are illiterate. The mean per capita income is Rs. 4068 for women in this group that is 9 per cent lower than the national average of Rs. 4485. In the selected sample 29 per cent of the women reside in a village which has good health facilities, another 40 per cent in villages with medium health facilities and 31 per cent in villages with poor health facilities. Just over one half of these women had access to an *Anganwadi* within the village.

Next we compare the basic statistics for the women who used at least one of the services with those who did not use any. There is a considerable difference in the demographic and economic profile of the users and the non-users. The women who used at least one of the above health services belong to families with higher per capita income (Rs. 4310). Only 57 per cent in this group are illiterate while 83 per cent of the non-users are illiterate. Access to health care was also limited for the non-users — only 37 per cent of these women had an *Anganwadi* in their village while 55 per cent of the users had an Anganwadi in their village. The next section looks at the utilisation rates after simultaneously controlling for all these factors.

4. EMPIRICAL ANALYSIS

The following section analyses the determinants of the five measures of maternity care mentioned earlier — blood pressure checkup, antenatal care, child delivery at home, use of trained help at the time of the delivery and postnatal care. The direct effects of education, information sources and health services are presented first, followed by the results from the interactions among these variables. All probit regressions include age and age squared of the woman, her primary occupation, state controls besides the variables included in the tables.

Basic Specification

Table 3 presents results from the first specification for the probit analysis of the utilisation of maternity services. The determinants include demand and supply side factors such as individual and household demographic characteristics, predicted per capita income and access to health facilities. The instruments used to predict per capita income include land ownership dummies, family size, ownership of farm assets such as farm machinery and tubewell, village level male and female wages. Table 4 presents similar results from a specification where ownership of physical and human capital are included directly to represent household income and wealth. Both tables present the coefficients only for the important right hand side variables.

Education

These results show that women's education is a significant determinant of all measures of maternity care usage for both specifications. Education is included as three sets of dummies for primary, middle and matriculate and higher education with no education being the excluded category. Results in Table 3 and Table 4 show that education significantly increases the use of antenatal and postnatal care as well as skilled help at the time of delivery and decreases the probability of a delivery at home. The effect is greatest for matriculate and higher education on all measures. The magnitude of these effects is best seen as the change in probability of utilisation due to a unit change in the explanatory variables as presented in Table 5 and Table 6. Primary education increases the chances of prenatal and postnatal care by 10 per cent relative to a woman with no education. The magnitude of these effects is lower for middle education (4 per cent and 8 per cent) and increases to about 10 per cent for higher education. Among the utilisation measures, the education effect is greatest in reducing the chances of delivery at home, ranging from a 13 per cent reduction for those women with primary education to 19 per cent for those with matriculation.

Husband's education also has a significant effect on most of the reproductive health care utilisation measures. Matriculate education has the largest and statistically significant impact on the probability of health care use. It increases the probability of pre and post natal care use by about 10 per cent and 8 per cent respectively and the probability of the use of trained help at the time of delivery by 7 per cent (Table 5). The magnitude of the effect of husband's education is larger in the reduced form specification (Table 4), indicating that husband's education affects utilisation directly through preferences and through increased household income.

Household Composition

Next we examine the impact of some household composition variables on maternity care utilisation. Most households in rural India are large multi-generation families with more than one woman. The presence of other women in the household is important for a number of reasons. They provide traditional maternity and childbirth information and advice from their own experience as well as assistance at the time of delivery. For maternity health care services 'home care' can supplement or completely substitute outside medical care as in the case of delivery related services. In addition, as the number of females in the family increases, household income may also increase. Thus, the presence of women in the family has two opposing effects on health care demand — the income effect that increases demand if reproductive health is a normal good and a 'home care' effect that families with more females might have a lower demand for certain maternity care services. After controlling for per capita income, with number of adult females as one of the instruments, results in Table 3 show that the number of females significantly increases the probability of home delivery and decreases the use of skilled help at the time of the delivery. An additional woman in the household decreases the chances of using trained help by 1.4 per cent. However, the reduced form specification in Table 4 shows no significant effect of number of females in the household on maternity care use as the two effects cancel each other. The variable does not have a significant effect on the use of prenatal and postnatal care.

The number of children affects the resources — time, effort and money — that are allocated to each child and to the unborn or newly born child with greater number of children decreasing resources available for the additional child. Since in this analysis, health care use applies to the last child born to the woman birth order of the child is the same as the number

of children for the woman. Thus, this variable also captures the birth order effect that is observed in other health outcomes for children. The large literature on child's welfare — health and education – has indicated the significance of birth order in household decision making in developing countries. Children born at lower parity have lower health and education outcomes. In the case of maternity care utilisation we might expect that women with greater number of children might use the past beneficial experience from health care use to have greater utilisation rates. However the results are in the opposite direction. The birth order effect could be due to a feeling of 'unwantedness' associated with births of higher order or that the parents feel more experienced and less inclined to use professional help, especially if there are explicit or implicit costs for this. However, we cannot completely separate the two effects in this analysis.

Tables 3 and 4 show strong and significant birth order effects for the use of reproductive health care. In the specification of Table 4, the variable captures both the birth order effect as well as the effect of a lower per capita income. It shows that higher the number of children, the lower is the probability of prenatal and postnatal care utilisation by the mother and greater the chances of home delivery. Including per capita income allows for the effect of children on household money resources but still does not control for the effect on time and effort. The birth order or number of children effect exists even after controlling for per capita income as shown in Table 3. Although significant, these effects are small in magnitude with the effect of a unit increase in the variable increasing the probabilities by only about 2 per cent.

This aspect of the dynamics of reproduction and use of health care has far reaching implications for intra-household distribution of resources and care among the children. It also affects equity across households because women in poorer households are more likely to have more children.

Wage, Income and Wealth

As mentioned earlier, the prenatal and postnatal care services are provided free or for a nominal price through the network of village health workers, anganwadis, and government hospitals. However, even when there is no explicit price for these services there is an implicit price in terms of the opportunity cost of time. Visits to the health facility imply time taken away from other activities. The value of this time would be the woman's reservation wage,

which would be the current market wage for a woman in the labour force. Thus if the price of the ANC or PNC is the woman's current wage, a higher wage would imply less use of these services. Wages of other family members should be included to allow for substitution of labour supply between the pregnant woman and other family members.

Unfortunately the dataset does not provide individual level labour supply or current wage information. Instead, we use gender specific village level wages, averaged over agricultural and non-agricultural activities, as the predicted current wage for men and women in the sample. In the probit regression, the coefficient of female wages in the regression represents the opportunity cost of time in using these free services. The average male wage represents the cross-price effects and captures substitution of female labour supply by male labour supply. Thus, an increase in male wages has a positive effect on utilisation rates, via a substitution of female work by male work and a pure income effect.

On the other hand, hospital delivery and the use of trained help at the time of delivery have explicit costs. Thus, male wages would affect the demand for these services via household income while, conditional on the fertility decision, we do not expect current female wage to affect the decision on place of delivery or the use of trained help. There is no avoidable opportunity cost of time associated with using these services. The reduced form specification in Table 4 uses physical and human capital and agricultural wages as proxies for household income. The average male wage always has a significant effect and increases the use of health care. However, the magnitude of these effects is small with the associated probability changes being between 0.2 per cent and 0.3 per cent for the different measures. Average female wages have a significant negative effect on ANC and PNC representing the implicit price of these services. This could be either because the actual time in using these services is high or, more likely, the physical distance to the service centres or queuing time is high. A unit increase in female wages decrease the chances of ANC utilisation by 0.4 per cent and PNC utilisation by 0.2 per cent. Since there is no opportunity cost of time at the time of delivery, female wages have no effect on hospital use or use of trained help for child delivery.

The results in Table 4 show that land holding class and ownership of farm machines are insignificant determinants of maternity care use. However, ownership of crop irrigation sources such as tubewells significantly increases the chances of a hospital delivery and the use of trained help with no effect on pre and postnatal care use. This suggests significant

income effects for the delivery services since irrigation substantially increases agricultural output and income.

Table 3 shows the direct effect of per capita income, instrumented using physical and human capital and wages. The results show that income is a significant determinant of the probability of home delivery and the probability of using trained help at the time of the delivery but does not affect the use of antenatal and postnatal care. However, the coefficients on land ownership indicate that, after controlling for per capita income, women from the land and business owning households are less likely to use ANC than those from the landless agricultural labour class. In India cultural and traditional practices often isolate pregnant women and restrict their physical movements. These are more likely to be observed in the landed and upper income categories in the rural areas and could lead to these results. The lower restrictions on women's movements in the wage earning households and their greater participation in the labour force makes it easier for them to seek professional health care services relative to other women.

An argument can be made that the average wages are capturing the development level of the villages rather than the opportunity cost of time. However, that does not explain the opposite signs on the coefficients of male and female wages. It is true that since we do not have actual wages and labour force participation these results are only indicative of wage effects but they point to the need for further research in this area. These results are also relevant to the use of other preventive health care by all adults thus making the location and accessibility of such services a vital policy issue.

Information Processing

The existing research on health outcomes in developing countries has shown the important role of media in disseminating information on health related issues. In India, radio and television are used by the government as important mediums for providing health information to the masses. Three sources of information are considered in this analysis – radio, television and newspapers and magazines. The coefficients on these information variables are significant even after controlling for the education of the woman and her spouse, thus reflecting the pure effect of these variables. The strongest effect among these is for listening to the radio. There is a 5 per cent increase in the probability of the use of natal care for a woman in a family where women frequently listened to the radio relative to a family where

no woman did. The effects of newspaper reading are minimal and significant only for the choice of place and method of delivery.

Transport Facilities

As mentioned in the context of wage effects, it seems that the opportunity cost of time is an important issue in determining health care use. This could be due to the physical distance to the health care centres so that means of transport, both public and private, become important in influencing decisions to seek prenatal and postnatal health care. The results show that ownership of vehicles does not have any effect on the utilization of health care but access to public transport is a significant determinant of the use of ANC and PNC. Greater the distance to the closest bus service lower the use of prenatal and postnatal care. Since public transport is unlikely to be used at the time of delivery, it is excluded from the regressions for child delivery services. However, this variable could also be picking up general development level of the village that reflects general awareness, exposure and facilities in the village.

Health Care Services

The coefficients on the health care facilities show that the most effective institution for antenatal care has been the ICDS (*Anganwadi*). Their local presence in the village and the personalised interactions of the staff has made them an important source of basic reproductive health care. This has important policy implications in terms of expansion of health facilities that are most effective. The presence of an *Anganwadi* in a village increases the chances of ANC use by 5 per cent relative to a village with no ICDS. However, the ICDS centre is not important for services associated with child delivery or postnatal care. As mentioned earlier, most of the postnatal care involves more complicated services than can be given by the ICDS centres. The results also indicate that the presence of other health care services within five kilometers of the village (best health service) significantly increases both ANC and PNC utilisation and the use of child delivery services by about 5 per cent. Thus, accessibility of health services, in terms of location and distance, is very important in the use of reproductive health services.

There are large variations in ANC usage across caste and religious groups, even after controlling for income and education. Muslim women and those from the schedule caste and tribes use significantly less prenatal and postnatal care than upper caste Hindu women. In addition, majority of the Muslim women deliver children at home without the help of trained

health workers. These results indicate a need for more focused programs to bring these communities at par with others. Similarly, large state level differences are also observed in the use of these health services that reflect state specific factors. These could be the demand side factors in terms of general education, information and awareness as well as the supply of such services, both in quantity and quality.

Education, Information and Health Interactions

The results presented above point to the significant impact of education, information and health care access on health care utilisation. In this section we examine some of the mechanisms through which these effects operate, e.g., does the education effect work through better information processing. We look at some of the interactions between the main explanatory variables to answer questions such as whether female education and media information are complements or substitutes or does higher education result in more health care usage for areas with better health facilities?

In order to examine how accessibility to health care centres affects health care use as market value of time increases, Table 7 presents results from a model with interaction between women's wages and access to health care facilities. Since this wage variable was not significant in the utilisation of child delivery service, the results presented here are only for prenatal and postnatal care services. In all cases the effect of female wage declines substantially in magnitude and becomes statistically insignificant. The direct effect of health facilities increases in most cases, the strongest effect being for the presence of the ICDS centre. The coefficient on this variable more than doubles and becomes statistically significant with the introduction of the interactions. The interaction terms are jointly insignificant except in the case of postnatal care utilisation. Given the opportunity cost of time spent in going to the health care centres, we expect that better access to health care facilities increases health care utilisation but at a decreasing rate as female wage increases. The results show a negative interaction effect in most cases and significantly so for the interaction between female wage and the presence of an ICDS center. They point to the gains in prenatal and postnatal care usage that can be made by reducing the time spent in accessing these services through health care policies that strengthen the network of local village level health workers.

Next, we consider the interactions between the woman's education and the information processing variables to see if one enhances the effect of the other. The results in Table 8 show that the introduction of the interaction terms does not affect the significance of the education terms in most cases. The magnitude of the direct effects are mostly unchanged for primary education but decline for middle and even more for matriculate education for almost all cases of maternity care use. The direct effects of the information variables are reduced in all cases except for the utilisation of postnatal care. The introduction of information and education interactions reduces the magnitude of the pure effect of these variables for ANC use and increases the pure effects for PNC usage.

Middle and higher education increase the effectiveness of the media in increasing the order to examine regional variations in maternity care utilisation, we repeated the above basic analysis for the utilisation of antenatal care and skilled help at the time of the delivery while decreasing the incidence of child delivery at home. Thus, strong complementarity exists between female middle and higher education and exposure to media. This in turn implies that the more educated women are better able to process and assimilate the information provided through the radio, television or the printed media. However, there are no significant cross effects in the utilisation of postnatal services. The interaction terms are jointly significant at the 5 per cent level only for the utilisation of antenatal care and home delivery.

Finally, Table 9 presents results from regressions that include interactions between women's education and access to health care facilities to examine the complementarity between the two. The pure effects of education and health care access increase in magnitude in many cases and continue to be significant. However, the interaction terms are jointly significant only for postnatal care implying that for other forms of maternal health care, education effects are not affected by access to health facilities. In the case of postnatal care, results indicate that middle and higher education are complements to the presence of an ICDS centre and easily accessible health facilities.

Results from regressions using education and land assets interactions show that the education effects do not work through class. We also tried to refine the wage effect results by introducing the interaction of average female wage with a dummy for the primary occupation of the woman. The results did not indicate that the wage effect was working through the

labour force status of the woman. However this could be because the dummy does not adequately represent current labour force participation status for the pregnant woman.

An attempt is also made to study the regional differences. Broadly, it may be stated that general utilisation rates are higher in the south. The magnitude of the effects of key determinants such as education and health care access variables is significantly different for these regions. The educational effects for lower levels of education are stronger in the north reflecting a greater marginal gain to be made by improving education levels in the north. This could be due to lower average level of education in the north relative to the south. Education effects are stronger for delivery variables in the south and PNC in the north.

5. CONCLUSIONS

One of the surest ways to improve the quality of life and human development amongst the masses in India is to provide for quality primary health care services especially in the rural areas. Since the health care services are concentrated in urban areas, the rural area programs should improve the outreach activities relating to health care delivery. This scheme is all the more essential in providing the reproductive care services that are related to mother and child care such as the ANC, natal and PNC services. Although the demand for such services are affected by a number of cultural stereotypes that are still prevalent in society, improving quality of services, making them easily available, providing them in their own villages and free of cost is absolutely essential. Since often pregnancy is not regarded as a condition that warrants medical and clinical attention new strategies have to be evolved to ensure that millions of pregnant and lactating mothers receive the benefits of modern technology that will reduce both maternal and infant and child mortality that is essential to speeding up the demographic transition towards low fertility and population stabilisation.

More specifically the use of reproductive health care such as antenatal and postnatal care and child delivery with the help of trained personnel greatly improves the chances of survival for the newborn. It results in healthier and stronger infants leading to good health in later life. It also leads to better health for the mother that in turn implies better health for the child. However, empirical research on the determinants of reproductive health care use has been limited because of lack of data.

This paper is an attempt to present analytical findings based on a large household level nationally representative sample survey of rural India undertaken in 1994. The results are fairly comprehensive and support a number of research findings that are now emerging from other parts of the world. The paper examines the relative importance of demographic and economic factors in determining the utilisation rates of maternal care services. The utilisation of reproductive health care services in India is significantly affected by the mother's education and family composition. Husband's education is also significantly correlated with health care utilisation, though the magnitude of this effect declines after controlling for household income. Women's exposure to information through the radio, television and newspapers also significantly increases the utilisation rates for all services. Economic factors such as wages and income are important only for child delivery services.

Access to locally available health services significantly increases maternity care use. An important health care facility in this respect has been the village level ICDS center.

The results also show that information sources such as radio and television are complementary to women's education in increasing the utilisation of health care. However, the interactions between education and access to health care facilities are insignificant except for the complementary relationship between higher education and access to health care facilities for PNC use.

These results point to the avenues through which policy makers can affect the utilisation of health care. That greater education for women and greater use of media to spread information, which work through changing preferences, enhance demand and utilisation is the prominent finding of this study. The supply side dimension such as the imminent expansion of local health care facilities, deserves the urgent attention of the policy makers. Policy efforts in improving education, spreading health care information through the media and providing a better local network of health workers will go a long way in augmenting development through improving the health of the mother and the child.

REFERENCES

Jeffery, Patricia, Roger Jeffery and Andrew Lyon (1988), *Labour Pains and Labour Power: Women and childbearing in India*, London: Zed Books Ltd.

Measham, Anthony R. and Meera Chaterjee (1999), *Wasting Away: The crisis of malnutrition in India*, Washington DC: World Bank.

Nayler, David C., Prabhat Jha, John Woods and Abusaleh Shariff (1999), *A Fine Balance: Some Options for Private and Public Health Care in Urban India*, Washington DC: World Bank, pp i – ix and 1–38.

Shariff, Abusaleh (1990), A Few Cultural Concepts and Socio-behavioural Aspects of Human Health in India, in *What We Know About Health Transition: The Cultural, Social and Behavioral Determinants of Health* (eds. J.Caldwell et al.), pp. 788–805, The Proceedings of an International Workshop, Canberra: The Australian National University.

Shariff, Abusaleh (1993), *Determinants of Child Health: Search for Maternal Education Effects in Gujarat*, Working Paper No. 47, Ahmedabad: Gujarat Institute of Development Research.

Shariff, Abusaleh (1999), *INDIA: Human Development Report*, New Delhi: Oxford University Press, June, pp. i–xiii and 1–370.

TABLE 1
Variables and Definitions

Community Level Variables	
Bus Far	Dummy Variable=1 if bus service beyond 9 kms of the village
Bus Medium	Dummy Variable=1 if bus service within 9 kms of the village
Bus Close	Dummy variable=1 if bus service in the village
Health worst	Dummy variable=1 if health centre not in the village and hospital > 5 kms from the village
Health Medium	Dummy variable=1 if health centre not in the village and hospital < 5 kms from the village
Health Best	Dummy variable=1 if health centre in the village and hospital < 5 kms from the village
Anganwadi	Dummy Variable=1 if the village has an ICDS centre (Integrated Child Development Services)
Household Level Variables	
Land 0	Dummy variable=1 if landless worker
Land 1	Dummy variable=1 if small or medium size farmer
Land 2	Dummy variable= 1 if large farmer
Land 3	Dummy variable =1 if landless and own business
Vehicle 0	Dummy variable =1 if no vehicle owned
Vehicle 1	Dummy variable =1 if family owns a cycle or bullock cart
Vehicle 2	Dummy variable =1 if the family owns a tractor or car
Radio	Dummy variable =1 if any (male/female) in the family frequently listens to the radio
Television	Dummy variable =1 if any (male/female) in the family frequently watches television
Newspaper	Dummy variable =1 if any (male/female) in the family frequently reads newspapers/magazines
Family size	The number of individuals in the household
Number of Adults	The number of individuals in the family in the age group 15-60 years
Number of Males	The number of males in the family in the age group 15-60 years
Number of Females	The number of females in the family in the age group 15-60 years
Number of Children	The number of children for the woman, in the age group 6-14 years
Individual Level Variables	
Age	Age in years
Illiterate	Dummy variable =1 if no schooling
Primary	Dummy variable=1 if 5 years of schooling

Middle	Dummy variable=1 if 8 years of schooling
Matriculation	Dummy variable=1 if 12 or greater years of schooling/college

TABLE 2
Sample Means

Variables	All Women (7635)	Users of Reproductive Health Care Services (5816)	Non-Users of Reproductive Health Care Services (1819)
TT Immunisation	19 %		
Iron Intake	10 %		
Blood Pressure Checkup	33 %		
ANC use	61 %		
Delivery at Home	75 %		
Trained Help for Delivery	52 %		
PNC use	26 %		
Illiterate	64 %	57 %	83 %
Primary Education	18 %	21 %	10 %
Middle Education	10 %	11 %	5 %
Matriculate and Higher Education	8 %	10 %	2 %
Poor Health Facility	31 %	28 %	39 %
Medium Health Facility	40 %	40 %	41 %
Good Health Facility	29 %	32 %	20 %
ICDS Center	51 %	55 %	37 %
Per Capita Income (Rupees)	4068	4310	3295

TABLE 3
Reproductive Health Care Utilisation[1]

Variables	Blood Pressure Check Up	Antenatal Care	Home Delivery	Delivery with Trained Help	Postnatal Care
Education (Self)					
Primary	0.299*	0.265*	-0.412*	0.181*	0.292*
Middle	0.317*	0.116***	-0.486*	0.339*	0.232*
Matriculation	0.631*	0.336*	-0.573*	0.243*	0.258*
Education (Husband)					
Primary	0.126*	0.105*	-0.001	0.087**	0.051
Middle	0.087	0.126*	-0.084	0.133*	0.079
Matriculation	0.161*	0.294*	-0.160*	0.153*	0.233*
Number of females	0.011	-0.014	0.032***	-0.034**	-0.026
Number of children	-0.084*	-0.048*	0.124*	-0.024	-0.054*
Land 1	0.075	-0.119*	0.087	-0.032	-0.060
Land 2	0.015	-0.071	-0.115**	0.122*	0.007
Land 3	0.137**	-0.095***	-0.141**	0.005	-0.097
Predicted Per Capita Income (Log)	- 0.149	0.080	-0.307*	0.280*	0.018
Information Variables					
Radio	0.152*	0.131*	-0.074***	-0.008	0.107*
Television	0.155*	0.105*	-0.109*	0.179*	0.074***
Newspaper/Magazines	0.004	-0.005	-0.142*	0.074	0.086
Transportation					
Vehicle 1	0.090**	0.043	0.026	-0.034	0.013
Vehicle 2	0.205*	-0.032	-0.004	-0.067	0.040
Bus Service (Medium)	-0.191*	-0.180*			-0.208*
Bus Service (Far)	-0.252*	-0.241*			-0.186*
Health Services					
Medium	-0.038	-0.004	-0.035	-0.009	0.016
Best	0.135*	0.143*	-0.136**	0.160*	0.193*
Anganwadi	0.068***	0.143*	-0.021	0.039	0.050
Muslims	-0.090	-0.114**	0.478*	-0.153*	-0.209*
Schedule Castes and Tribes	-0.100**	-0.082**	0.134*	-0.077**	-0.004
Other Minorities	0.277*	0.090	-0.029	0.080	0.205**

[1] * - Significant at 1%.
** - Significant at 5%.
*** - Significant at 10%

TABLE 4
Reproductive Health Care Utilisation[2]

Variables	Blood Pressure Checkup	Antenatal Care	Home Delivery	Delivery with Trained Help	Postnatal Care
Education (Self)					
Primary	0.296*	0.262*	-0.412*	0.180*	0.295*
Middle	0.312*	0.111***	-0.471*	0.331*	0.231*
Matriculation	0.637*	0.345*	-0.550*	0.223*	0.260*
Education (Husband)					
Primary	0.126*	0.109*	-0.008	0.095*	0.058
Middle	0.083	0.137*	-0.103***	0.157*	0.089
Matriculation	0.155*	0.314*	-0.200*	0.204*	0.259*
Number of females	0.030	-0.005	0.008	0.010*	0.001
Number of children	-0.073*	-0.055*	0.150*	-0.047*	-0.056*
Income and Wealth Proxies					
Land 1	0.039	-0.087**	-0.007	0.055	-0.038
Land 2	0.019	-0.064	-0.122	0.130*	0.023
Land3	0.123*	-0.081	-0.161	0.025	-0.100
Farm machine	0.013	0.051	0.089	-0.124	-0.137
Tubewell	-0.085	0.006	-0.201*	0.171*	-0.113***
Average Male Wage	0.006**	0.008*	-0.010*	0.008*	0.008*
Average Female Wage	-0.011*	-0.012*	0.004	-0.002	-0.005*
Information Variables					
Radio	0.142*	0.123*	-0.066	-0.010	0.103*
Television /Cinema	0.152*	0.105*	-0.100*	0.180*	0.078***
Newspaper/Magazines	0.0003	-0.009	-0.137*	0.075	0.081
Transportation					
Vehicle 1	0.063	0.055	-0.033	0.030	0.031
Vehicle 2	0.127***	-0.009	-0.198	0.154*	0.138
Bus Service (Medium)	-0.187*	-0.178*			-0.205*
Bus Service (Far)	-0.243*	-0.232*			-0.183*
Health Services					
Medium	-0.051	-0.015	-0.011	0.020	0.010
Best	0.129*	0.146*	-0.107*	0.152*	0.189*
Anganwadi	0.060	0.132*	0.009	0.012	0.037
Muslims	-0.092	-0.120*	0.485*	-0.161*	-0.217*
Schedule Castes and Tribes	-0.098*	-0.082*	0.126*	-0.082**	-0.013
Other Minorities	0.279*	0.084	-0.019	0.075	0.206*

[2] * - Significant at 1%.
** - Significant at 5%.
***- Significant at 10%.

TABLE 5
Reproductive Health Care Utilisation – Changes in Predicted Probability[3](%)

Variables	Blood Pressure Check Up	Antenatal Care	Home Delivery	Delivery with Trained Help	Postnatal Care
Education (Self)					
Primary	10.8*	9.6*	-12.9*	7.1*	9.5*
Middle	11.6*	4.3***	-15.9*	13.0*	7.6*
Matriculation	23.8*	11.8*	-19.1*	9.4*	8.4*
Education (Husband)					
Primary	4.4*	3.9*	-0.02	3.4*	1.6
Middle	3.0	4.6*	-2.4	5.2*	2.5
Matriculation	5.7*	10.6*	-4.7*	6.0*	7.5*
Number of females	0.3	-0.5	0.9***	-1.4*	-0.8
Number of children	-2.9*	-1.8*	3.5*	-0.9	-1.7*
Land 1	2.6	-4.5*	2.4	-1.3	-1.8
Land 2	0.5	-2.7	-3.3**	4.8*	0.2
Land 3	4.8**	-3.6***	-4.2**	-0.2	-2.9
Predicted Per Capita Income (Log)	-5.1	-3.0	-8.8*	11.1*	-0.6
Information Variables					
Radio	5.3*	4.9*	-2.1***	-0.3	3.3*
Television	5.4*	3.9*	-3.2*	7.1*	2.3***
Newspaper/Magazines	0.1	-0.2	-4.2*	2.9	2.7
Transportation					
Vehicle 1	3.1**	1.6	0.7	1.3	0.4
Vehicle 2	7.4*	1.2	-0.1	2.7	1.2
Bus Service (Medium)	-6.4*	-6.8*			-6.1*
Bus Service (Far)	-8.1*	-9.2*			-5.4*
Health Services					
Medium	-1.3	-0.2	-1.0	-0.4	0.5
Best	4.7*	5.3*	-4.0**	6.3*	6.1*
Anganwadi	2.3***	5.3*	-0.6	1.5	1.5
Muslims	3.1	-4.3**	11.5*	-6.1*	-6.1*
Schedule Castes and Tribes	3.5**	-3.1**	3.7*	-3.0**	-0.1
Other Minorities	10.0*	3.3	-0.8	3.1	6.7**

[3] * - Significant at 1%.
** - Significant at 5%.
*** - Significant at 10%.

TABLE 6
Reproductive Health Care Utilisation – Changes in Predicted Probabilities[4](%)

Variables	Blood Pressure Checkup	Antenatal Care	Home Delivery	Delivery with Trained Help	Postnatal Care
Education (Self)					
Primary	10.7*	9.5*	-12.9*	7.0*	9.6*
Middle	11.4*	4.1***	-15.3*	12.7*	7.5*
Matriculation	24.1*	1.21*	-18.2*	8.7*	8.5*
Education (Husband)					
Primary	4.4*	4.0*	-0.2	3.8*	1.8
Middle	2.9	5.0*	-3.0***	6.2*	2.8
Matriculation	5.5*	12.1*	-5.9*	8.0*	8.3*
Number of females	1.0	-0.2	0.2	0.4	0.04
Number of children	-2.5*	-2.1*	4.2*	-1.9*	-1.7*
Income and Wealth Proxies					
Land 1	1.3	-3.3**	-0.2	2.2	-1.2
Land 2	0.7	-2.4	-3.6	5.1*	0.7
Land3	4.3*	-3.1	-4.8	1.0	-3.0
Farm machine	0.5	1.9	2.4	-5.0	-4.0
Tubewell	-2.9	0.2	-6.1*	6.7*	-3.4***
Average Male Wage	-0.2*	0.3*	-0.3*	0.3*	0.2*
Average Female Wage	-0.4*	-0.4*	0.1	-0.1	-0.2*
Information Variables					
Radio	4.9*	4.6*	-1.9	-0.4	3.2*
Television /Cinema	5.3*	3.9*	-2.9*	7.1*	2.4***
Newspaper/Magazines	0.01	-0.3	-4.0*	3.0	2.5
Transportation					
Vehicle 1	2.2	2.1	-0.9	1.2	0.9
Vehicle 2	4.5***	-0.3	-6.0*	6.0*	4.4
Bus Service (Medium)	-6.2*	-0.67*			-6.0*
Bus Service (Far)	-7.9*	-8.9*			-5.3*
Health Services					
Medium	-1.8	-0.6	-0.3	-0.8	0.3
Best	4.5*	5.3*	-3.1*	6.0*	5.9*
Anganwadi	2.1	-4.9*	0.3	0.5	1.1
Muslims	-3.1	-4.6*	11.6*	-6.4*	-6.2*
Schedule Castes and Tribes	-3.4*	-3.1*	3.5*	-3.2**	-0.4
Other Minorities	10.2*	3.2	-0.6	2.9	6.7*

[4] * - Significant at 1%.
** - Significant at 5%.
*** - Significant at 10%.

TABLE 7
Reproductive Health Care Utilisation – Wage and Health Services[5]

Variables	Blood Pressure		Antenatal Care		Postnatal Care	
	Without Interactions	With Interactions	Without Interactions	With Interactions	Without Interactions	With Interactions
Income and Wealth Proxies						
Land 1	0.039	0.040	-0.087**	-0.086***	-0.038	-0.032
Land 2	0.019	0.019	-0.065	-0.065	0.024	0.020
Land3	0.123*	0.125*	-0.081	-0.078	-0.100	-0.095
Farm machine	0.013	0.011	0.051	0.050	-0.137	-0.147
Tubewell	-0.085	-0.089	0.006	0.003	-0.113***	-0.112***
Average Male Wage	0.006*	0.006*	0.008*	0.008*	0.008*	0.007*
Average Female Wage	-0.011*	-0.007***	-0.012*	-0.004	-0.005*	-0.002
Health Services						
Medium	-0.051	-0.044	-0.015	0.102	0.010	-0.038
Best	0.129*	0.173	0.146*	0.286*	0.189*	0.133
Anganwadi	0.060	0.223*	0.132*	0.249*	0.037	0.210*
Health Medium x Female Wage		0.0001		-0.004		0.002
Health Best x Female Wage		-0.0015		-0.005		0.003
Anganwadi x Female Wage		-0.0063**		-0.004		-0.007*
$P > X^2$ (interactions)		0.268		0.238		0.072

[5] * - Significant at 1%.
** - Significant at 5%.
*** - Significant at 10%.

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TABLE 8
Reproductive Health Care Utilisation – Education and Information Processing

Variables	Blood Pressure		Antenatal Care		Home Delivery		Delivery with Trained Help		Postnatal Care	
	Without Interactions	With Interactions	Without Interactions	With Interactions	Without Interactions	With Interactions	Without Interactions	With Interactions	Without Interactions	With Interactions
Land 1	0.075	0.077	-0.119*	-0.123*	0.087	0.086	-0.032	-0.037	-0.060	-0.057
Land 2	0.015	0.018	-0.071	-0.072	-0.115**	-0.120	0.122*	0.125*	0.007	0.008
Land3	0.137**	0.137**	-0.095***	-0.099***	-0.141**	-0.140**	0.005	0.004	-0.097	-0.094
Predicted Per Capita Income (Log)	- 0.149	-0.144	0.080	0.086*	-0.307*	-0.320*	0.280*	0.289*	0.018	0.025
Education (Self)										
Primary	0.299*	0.282*	0.265*	0.240*	-0.412*	0.430*	0.181*	0.196*	0.292*	0.287*
Middle	0.317*	0.192***	0.116***	0.129	-0.486*	0.300*	0.339*	0.278*	0.232*	0.356*
Matriculation	0.631*	0.391*	0.336*	0.170	-0.573*	0.401*	0.243*	0.134	0.258*	0.277**
Education (Husband)										
Primary	0.126*	0.134	0.105*	0.106*	-0.001	0.005	0.087**	0.086**	0.051	0.046
Middle	0.087	0.101***	0.126*	0.127*	-0.084	0.098	0.133*	0.137*	0.079	0.075
Matriculation	0.161*	0.167*	0.294*	0.295*	-0.160*	0.164*	0.153*	0.148*	0.233*	0.227*
Information Processing										
Radio	0.152*	0.109*	0.131*	0.114*	-0.074***	0.094	-0.008	0.027	0.107*	0.124*
Television	0.155*	0.131*	0.105*	0.069	-0.109*	0.034	0.179*	0.109*	0.074***	0.091***
Newspaper/Magazines	0.004	-0.028	-0.005	0.102	-0.142*	0.057	0.074	0.077	0.086	0.053
Radio X Primary		-0.020		-0.046		0.144		-0.134		-0.022
Radio X Middle		0.280*		-0.038		-0.152		-0.056		-0.089
Radio X Matriculation		0.234		0.479*		0.006		-0.020		-0.030
Television X Primary		0.104		0.147		-0.140		0.210*		0.040
Television X Middle		-0.046		0.157		-0.278**		0.202		-0.143
Television X Matriculation		0.066		-0.173		-0.051		0.027		-0.020
Newspaper X Primary		-0.066		-0.124		0.056		-0.200		-0.036
Newspaper X Middle		-0.013		-0.309***		0.182		-0.021		0.126
Newspaper X Matriculation		0.161		-0.117		-0.401**		0.262		0.088
P > X^2 (interactions)		0.263		0.055		0.021		0.146		0.952

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TABLE 9
Reproductive Health Care Utilisation – Education and Health Services

Variables	Blood Pressure		Antenatal Care		Home Delivery		Delivery with Trained Help		Postnatal Care	
	Without Interactions	With Interactions	Without Interactions	With Interactions	Without Interactions	With Interactions	Without Interactions	With Interactions	Without Interactions	With Interactions
Land 1	0.075	0.021	-0.119*	-0.121*	0.087	0.088	-0.032	-0.016	-0.060	-0.063
Land 2	0.015	0.008	-0.071	-0.076***	-0.115**	-0.117**	0.122*	0.123*	0.007	0.007
Land3	0.137**	0.117**	-0.095***	-0.097***	-0.141**	-0.137**	0.005	0.013	-0.097	-0.090
Predicted Per Capita Income (Log)	- 0.149	0.029	0.080	0.089	-0.307*	-0.297*	0.280*	0.222*	0.018	0.051
Education (Self)										
Primary	0.299*	0.395*	0.265*	0.324*	-0.412*	-0.389*	0.181*	0.177***	0.292*	0.330
Middle	0.317*	0.227	0.116***	0.136	-0.486*	-0.462*	0.339*	0.169	0.232*	0.051
Matriculation	0.631*	0.550	0.336*	0.368**	-0.573*	-0.300**	0.243*	0.449*	0.258*	0.521
Education (Husband)										
Primary	0.126*	0.125	0.105*	0.108*	-0.001	0.001	0.087**	0.086**	0.051	0.047
Middle	0.087	0.074	0.126*	0.125*	-0.084	-0.082	0.133*	0.140*	0.079	0.077
Matriculation	0.161*	0.147	0.294*	0.298*	-0.160*	-0.162*	0.153*	0.159	0.233*	0.228
Health Services										
Medium	-0.038	-0.078	-0.004	-0.179*	-0.035	-0.040	-0.009	0.003	0.016	-0.039
Best	0.135*	0.147*	0.143*	-0.237*	-0.136**	-0.064	0.160*	0.156	0.193*	0.177*
Anganwadi	0.068***	0.094**	0.143*	0.005	-0.021	-0.009	0.039	0.029	0.050	0.092***
Health Medium X Primary		-0.027		-0.054		0.055		-0.091		0.045
Health Medium X Middle		0.166		-0.056		0.015		0.243		0.316**
Health Medium X Matriculation		0.342		0.006		-0.176		-0.231		0.012
Health Best X Primary		-0.004		0.029		-0.178		-0.038		0.080
Health Best X Middle		0.027*		-0.184		-0.114		0.187		0.368*
Health Best X Matriculation		-0.007		-0.086		-0.217		-0.111		-0.240
Anganwadi X Primary		-0.143		-0.085		0.029		0.095		-0.148
Anganwadi X Middle		0.062		0.121		0.019		0.015		-0.126
Anganwadi X Matriculation		-0.098		-0.031		-0.214***		-0.118		-0.233**
P > X^2 (interactions)		0.202		0.879		0.423		0.563		0.043

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