

**SOCIOECONOMIC DETERMINANTS OF MATERNAL HEALTH
BEHAVIOR IN PAKISTAN: AN INSTRUMENTAL VARIABLE APPROACH**

By

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Abstract

Utilization of maternal health services is a complex behavioral phenomenon. Empirical studies have established that the use of maternal health services is related to social and cultural structures, household factors and personal characteristics of women such as education and health knowledge. Yet the causal mechanism through which education of women in Pakistan affects their health seeking behavior is poorly understood. Using the 2006-07 Pakistan Demographic Health Survey (PDHS) information on women aged 15-49 who had given at least one birth in the three years prior to the survey, this study aims to; (i) determine which socioeconomic factors affect maternal health care utilization behavior of women, and (ii) identify the pathway through which effect of women's education is transmitted to their maternal health seeking behavior.

Empirical analysis is conducted using instrumental variable technique and community fixed effects. The results of the analysis indicate that women's predisposing factors such as educational attainment, child's birth order, spouse's educational attainment and type of occupation, along with female empowerment are important determinants of maternal health seeking behavior of women in Pakistan. Results of this study also confirm an important role played by women's health knowledge, independent of educational attainment, on their maternal health care utilization.

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Abbreviations

2SLS	Two Stage Least Squares
ANC	Antenatal Care
IV	Instrumental Variable
KPK	Khyber Pakhtunkhwa
LHW	Lady Health Worker
MDG	Millennium Development Goal
MHB	Maternal Health Behavior
MMR	Maternal Mortality Ratio
OLS	Ordinary Least Squares
PDHS	Pakistan Demographic Health Survey
PNC	Postnatal Care
TT	Tetanus Toxoid

List of Tables and Figures

Table 1: Descriptive Statistics

Table 2: List of Dependent Variables

Table 3: Proportion of women from households that own radio or television

Table 4: Probit Results for Maternal Health Care Utilization Behavior of Women in Pakistan

Table 5: Proportion of working women with respect to their socioeconomic status

Table 6: Nature of occupation of working women

Table 7: Cluster Fixed Effects for Maternal Health Care Utilization Behavior of Women in Pakistan

Figure 1: Conceptual Framework for determinants of health seeking behavior in Pakistan

Table of Contents

Abstract.....	i
Acknowledgements	ii
Abbreviations.....	iii
List of Tables and Figures.....	iv
Chapter 1 Introduction	1
Chapter 2 A Review of Literature.....	4
Chapter 3 Data Description and Summary Statistics.....	12
Chapter 4 Conceptual Framework and Estimation Strategy.....	18
4.1. Variable Description.....	19
4.2. Specification Issues and their Solutions.....	20
4.2.1 Potentially Endogenous Variable.....	20
4.2.1 Omitted Variable Problem.....	22
4.3. Estimation Strategy.....	24
Chapter 5 Results and Empirical Findings.....	26
5.1. Second Stage Results.....	27
5.2. Community Fixed Effects.....	39
5.3. Robustness Checks.....	46
Chapter 6 Conclusion and Policy Recommendations.....	48
References.....	52
Appendix.....	58

1. Introduction

World Health Organization (WHO) defines maternal health as “health of women during pregnancy, childbirth and postpartum period. While motherhood is a positive and fulfilling experience, for far many women it is associated with suffering, ill-health and even death” (WHO).

Women play a principle role in shaping a society and yet they are at an alarmingly high risk in terms of maternal morbidity and mortality. Every life lost in pregnancy and childbirth has multiplicative effects since women are responsible for the upbringing of children and managing household affairs (see Tura & Mariam, 2008). These spillovers of maternal health begin from the time a woman gets pregnant. Decisions made during pregnancy, at the time of delivery and post delivery have lifetime implications on mother and child alike. Decreasing maternal mortality is therefore, one of the most important global agendas.

The Government of Pakistan has made extensive efforts to decrease maternal mortality. The country has some of the most comprehensive mother and child health care programs with nation- wide out reach. Despite this progressive spending, the situation remains dismal. While the progress for none of the Millennium Development Goals (MDG) is sufficient to meet their targets, one of the least progressive is the MDG 5¹. UNICEF reported maternal mortality ratio in Pakistan to be 250 per 100,000 live births in 2010. At this rate, by 2015, Pakistan is most likely to miss the MDG 5 of 140 deaths per 100,000 births by a huge margin (Government of Pakistan, Planning Commission, Centre for Poverty Reduction and Social Policy Development, 2010) .

¹ The goal is to reduce the maternal mortality ratio by three-quarters between 1990 and 2015 and achieve universal access to reproductive health by 2015.

While utilization of maternal health services depends upon the provision of health care services, major impediments to improve maternal health are the demand side constraints. Pakistan is a patriarchal society with complex family structures. Decision to seek medical help is made not only at individual level but household and community characteristics play an important role as well. Therefore, successful provision of good services should involve not only increasing their supply but aim to eradicate the economic, social and cultural barriers faced by women in receiving health care.

An extensive amount of literature on socioeconomic determinants of maternal health exists on Bangladesh, India and Nepal. Yet there is a dearth of literature on Pakistan. Moreover, these studies have limited application for entire Pakistan in its entirety because they employ data from specific regions or provinces of the country. A major body of these studies identifies the direct effect some socioeconomic determinants have on maternal health behavior (age, birth order or previous fetal loss). However, determinants like education do not have a direct effect on the outcome variable. Other branches of health literature, such as child health, have extensively studied the pathway through which education affects health seeking behavior of an individual. Nevertheless, there is paucity of studies that underpin this causal mechanism in the maternal health literature

This paper is an extension of existing studies that identify key socioeconomic determinants of maternal health care utilization by women in Pakistan. The twofold objective of this paper is to; (i) to determine which socioeconomic factors affect utilization of maternal health care services by women in Pakistan, and (ii) to identify the pathway through which effect of women's education is transmitted to their maternal health seeking behavior. There is a paucity of empirical studies on maternal health in Pakistan that underpin this mechanism.

Empirical analysis on individual, household and community characteristics of rural as well as urban areas will be carried out using the extensive data drawn from Pakistan Demographic Health Survey (PDHS) 2006-07. One of the reasons for limited research on Pakistan is the lack of quality data. The PDHS (2006-07) is an exception in that it provides a much needed picture of the status of maternal health in Pakistan.

The structure of the paper is as follows; Section two provides an overview of existing literature on the maternal health behavior. Section three provides a description of the data set to be used, and Section four outlines the conceptual framework and econometric methodology. Empirical findings are presented in Section 5, followed by conclusion and policy recommendation in Section 6.

2. A Review of Literature

The issue of maternal health and mortality lies at the heart of developmental concern for many developing countries. Not only because it reflects the dismal condition of a country's health system but also because maternal health is a barometer of a nation's development. Over time, efforts have been made by researchers and econometricians to identify the binding constraints in the area and formulate optimal policies to deal with the issue. As a result, there exists a substantial amount of theoretical and empirical literature on developing countries, to recognize the causes and determinants of women's uptake of maternal health care services (see Elo, 1992; Bhatia & Cleland, 1995; Celik & Hotchkiss, 2000; Gyimah, Takyi, & Isaac, 2006; Mumtaz & Salway, 2007; Sepehri, Sarma, Simpson, & Moshiri, 2008; Amin, Shah, & Becker, 2010; Singh, Rai, Alagarajan, & Singh, 2012).

Researchers and econometricians have made several attempts to identify the determinants of a woman's reproductive health seeking behavior. These studies can be generally categorized into; (i) studies that identify supply side factors that determine health seeking behavior such as infrastructure quality, availability of health care facilities in a region, and (ii) studies that examine demand side determinants of maternal health care utilization, such as education, age or women's autonomy. However, as socioeconomic factors became widely recognized as a major impediment to improve maternal health in developing countries, there has been a recent shift to studies that aim to identify demand side constraints to maternal health care behavior. Nonetheless, empirical studies regarding socioeconomic determinants of maternal health behavior in Pakistan remain limited. This study aims to fill this gap and is an extension of the second category.

Age of the mother is one of the well established determinants of maternal health behavior in the existing literature (see Elo, 1992; Celik & Hotchkiss, 2000; Dasgupta et al., 2007; Amin et al., 2010 ; Singh et al., 2012). Elo (1992) established that utilization of antenatal care and assisted delivery was higher among older women in Peru. According to the author, this might be because experience acquired by older women influence their maternal health behavior (Elo, 1992). Conversely, the study conducted by Amin et al. (2010) in rural Bangladesh documented that utilization of maternal health care services was higher among women who were less than twenty years old. These results were supported by findings of Singh et al. (2012) in rural India who argued that pregnancy at young age is associated with adolescent marriages, when the women tend to be psychologically and emotionally less mature, lack awareness about reproductive issues which can cause them to seek medical help.

Women's schooling is often found to be positively correlated with their health seeking behavior. Drawing on Peruvian Demographic Health Survey, Elo (1992) found that women's use of maternal health care services in Peru is strongly influenced by the level of formal schooling received by them. The author was of the opinion that education transforms the dynamics of a household, modifies woman's beliefs because educated women are better processors of knowledge. This conclusion is in line with the findings of Amin et al. (2010) and Singh et al. (2012); mother's education significantly affects utilization of maternal health care services.

An interesting observation in the literature is that education has a direct and indirect effect on outcome variables. It is argued that while schooling increases women's health knowledge, cognitive skills acquired at school increase ability of women to assess and assimilate information and increase their stock of health knowledge even after they leave school. Glewwe

(1999) proposed that “literacy and numeracy skills learned in schools may enhance mothers’ abilities to treat child illness, conditional on health knowledge, and also help mothers increase their stock of health knowledge after leaving school” (Glewwe, 1999, p.125). Recent literature on health focuses on underpinning the mechanism of education on health, for example pathway through which mother’s education has an effect on her child’s health (see Thomas, Strauss, & Henriques, 1991; Glewwe, 1999; Kovsted, Portner, & Tarp, 2002; Webb & Block, 2003). Results have established that the significantly positive influence mother’s schooling has on child health diminishes once health knowledge is introduced as an explanatory variable.

Conversely, these mechanisms are understudied in the maternal health literature. Elo (1992) and LeVine, LeVine, Rowe, & Anzola (2004) are responsible for raising the “question of whether literacy could be mediating the relationships of schooling to maternal health behavior in populations undergoing demographic transitions” (LeVine et al., 2004, p.863). Elo (1992) and Celik & Hotchkiss (2000) discussed possible mechanism through which women’s education affect their health seeking behavior but the authors did not empirically test any mechanism. LeVine et. al (2004) established that, in Lalitpur district of the Kathmandu Valley of Nepal, women retain cognitive skills learned in school in their adulthood which influences their health knowledge.

The combined evidence provided by Glewwe, (1999), Kovsted et al., (2002), Webb & Block, (2003), LeVine et al. (2004) and Aslam & Kingdon, (2012) provide the rationale for studying the causal mechanism through which women’s education translates into their reproductive and health seeking behavior.

Glewwe, (1999), followed by Kovsted et al. (2002), Webb & Block, (2003), Aslam & Kingdon, (2012) suggested that while health knowledge enables women to recognize the need for health care, utilization of health care services can cause women to acquire additional health knowledge. Health knowledge, therefore, may in itself be an endogenous variable if it is correlated with the unobservable individual characteristics as well as the outcome variable of interest. Studies have addressed this endogeneity issue by using the instrumental variable technique. Most widely used instruments for health knowledge are mass media exposure, mother's education, existence of close relatives (see Glewwe, 1999; Kovsted et al. 2002; Webb & Block; 2003, Aslam & Kingdon, 2012).

The present study uses mass media exposure of a woman as an instrumental variable for health knowledge (see Glewwe, 1999).

Glewwe (1999) instrumented for mother's health knowledge by using mass media exposure as the instrumental variable. The author attempted to capture mother's mass media exposure by the number of radios and televisions owned by the household and availability of local newspapers. However, ownership of radio or television by a household does not necessarily mean that women have access to them. Aslam & Kingdon (2012) took a step further and considered a woman exposed to mass media only if she reported watching television. Even so, this approach of capturing mass media exposure neither indicate the frequency with which women watch television nor does it point out the type of programs they view on television.

Prior studies have recognized that due to patriarchal nature of Asian settings, women's position is multidimensional and intra-household decisions are complex. Therefore women's health seeking behavior is often dependent on her husband or household head. Male

involvement in reproductive health care is becoming increasingly recognized. Husband's education is considered as an important factor that may influence the choice of health-care utilization. (Mullany, Becker, & Hindin, 2007). A study conducted by Singh & Shariff (2002) in India reported that spouses educated up to matriculate level have a strong impact on the probability of antenatal, safe delivery and postnatal care utilization by women.

Additionally, birth order of a child is a key factor in determining maternal health seeking behavior of women. One possible explanation for this is that a woman pregnant with her first child is more cautious and has a greater probability of utilizing medical assistance than women at higher parity level. On the contrary, women with higher number of children tend to attach less importance to pregnancy particularly if they have not experienced difficulties in previous pregnancies (see Elo, 1992; Celik & Hotchkiss, 2000). Similarly, a woman who has experienced fetal loss previously has a higher likelihood of being cautious and utilizing maternal health care (Midhet et al. 1998). Conversely, Bhatia & Cleland (1995) found the opposite results in South India. Their finding revealed that the birth order is an important component of maternal health because the higher the birth order, more are the chances of complications in delivery. Thus a woman with higher number of children is more likely to use medical assistance.

Ahmed & Mosley (2002) established that utilization of health care and desire to have fewer kids are governed by same demand side elements. These results are supported by Sepehri, Sarma, Simpson, & Moshiri (2008). Their results postulate that the desire to have more children significantly affect the health seeking behavior of women. This might be because women who want a child are more likely to seek health care, to ensure safe birth of the child.

The ability of a woman to manipulate her personal environment through control over resources and information, in order to make decisions about their own concerns or about close family members, has been established as a strong determinant of maternal health care (see Furuta & Salway, 2006; Mumtaz & Salway, 2007; Hou & Ma, 2011). They all agree that control over finances is an important, but not the only component of female empowerment. In Asian settings, intra-household decisions are multidimensional and involvement of women in decision making process is an aspect of empowerment as well. A better proxy for empowerment is a woman's involvement in decision making process. (Furuta & Salway, 2006)

Several studies have recognized utilization of health services by a household to be a function of its permanent and temporary income, also known as wealth and income, respectively (see, for instance, Celik & Hotchkiss, 2000; Shariff & Singh, 2002; McTavish et al., 2010; Ahmed Et al., 2010). A more widely used measure in the prevailing literature is wealth since it includes such assets that help in income generation as well. Amin et al. (2010) and McTavish et al. (2010) constructed a composite wealth index, comprising of all durable assets as well as characteristics of a household. They found that wealthier households use maternal health care services more frequently than less affluent households.

Size of a household as well as family structure can significantly alter individual consumption patterns. With large multigenerational families there is a hierarchal structure which implies a young woman would have less authority to take her own decisions. Shariff & Singh (2002), Mumtaz & Salway (2007) and Singh et al. (2012) established that this is the case because in marginalized societies like Pakistan, older women are considered to be wiser and experienced and are therefore believed to take better decisions and a pregnant woman is not supposed to

voice her opinion. However, in a nuclear family system, with few household members, each individual is most likely to take his or her own decision.

Another important determinant of maternal health care by an individual are the community level factors such as physical accessibility to hospital or pharmacy or road infrastructure (see Elo, 1992; Celik & Hotchkiss; 2000, Gyimah et al, 2006; Gage & Calixte, 2006; Sepehri et al. 2008; Amin et al. 2010). After adjusting for individual-level factors, Gage & Calixte (2006) found that poor road conditions and lack of transportation significantly reduces the likelihood of timely receipt of antenatal care and of four or more antenatal care visits, while the availability of a health center within five kilometers significantly increases the use of medical assistance by the mother.

Maternal health and its determinants in the Pakistani context have been examined to some extent in the existing literature (see Midhet et al., 1998; Nisar & White, 2003; Mumtaz & Salway, 2007; Dasgupta et al. 2007; Ali et al. 2008; Agha & Carton, 2011; Hou & Ma, 2011). Some of these studies focus on the determinants of health care utilization while others attempted to assess the impact of women's autonomy or the supply side factors on maternal health care. These studies are limited in scope because they include data from specific regions and provinces of Pakistan. Their results are not generalizable to the entire country either because most of them are drawn from qualitative interviews and focus group discussions. Only a few studies on Pakistan have employed empirical estimation techniques to identify a causal mechanism (see Nisar & White (2003); Agha & Carton (2011); and Hou & Ma (2011). However, these studies are based on simplistic assumptions and techniques which deem the results questionable because identifying determinants of health seeking behavior is a complex area of research.

Also, most of the studies on maternal health used only antenatal consultation as dichotomous dependent variables. However, according to WHO (2006) and Sepehri et al. (2008), full antenatal care comprises of tetanus toxoid (TT) injections and the frequency of visits to health care facility. In addition, unlike prenatal care and safe delivery, the role of postnatal care as a strong pillar of safe motherhood is relatively untapped in the literature. Agha & Carton (2011) and Hou & Ma (2011) are two recent studies which employed postnatal care from a trained service provider as a component of maternal health care services in Pakistan.

This study aims to augment the existing literature on determinants of maternal health care in Pakistan by using a Probit model. It aspires to identify the pathway through which women's education translates into their maternal health seeking behavior, which is understudied in the maternal health literature on Pakistan. To take into account the endogeneity problems, community fixed effects and instrumental variable technique will be used. Moreover, the analysis will use not only utilization of antenatal care services but also its frequency, type of delivery and utilization of post natal care as dependent variables.

The dataset used in this study is Pakistan Demographic and Health Survey (PDHS) 2006-07. Neither these outcome variables, together, nor PDHS, a rich data set, have been used for the studies on fertility in Pakistan.

3. Data Description and Summary Statistics

The empirical analysis is conducted by using nationally representative cross-sectional data set of Pakistan Demographic Health Survey (PDHS) 2006-07 which covers over 92,340 households. The survey was conducted by the National Institute of Population Studies (NIPS) and involved two stage sampling. In the first stage, a total of 1000 clusters were identified while in the second stage, 105 households were picked from each sampling point. The purpose of PDHS is to monitor the population and health situation in Pakistan and track performance of the Millennium Development Goals.

The rationale for using PDHS is that it has comprehensive information about marriage, fertility preferences, use of family planning methods and maternal health care utilization. Moreover, the data is collected from rural as well as urban areas from all provinces of Pakistan, making it appropriate for across country analysis. Furthermore, there is a paucity of fertility studies on Pakistan that employed PDHS (2006-07).

The questionnaire used in PDHS gathered extensive information at household level as well as individual level. However, this analysis will be conducted at individual level. Total sample size is 10,023 women. The working sample comprises women from the age group 15-49, those who are currently married and gave at least one birth three years prior to the survey². PDHS has a broad range of information available on each birth given by a woman. To ensure utilization of accurate information, this study will only focus on the latest birth of a woman which is closest to the time of interview. This sample comprises of 4,475 women, 65 percent residing from rural and 34 percent from urban areas.

² The rationale for restricting the sample to at least one birth in three years prior to the survey is that women might not give accurate response for births prior to this interval (see Cleik & Hotchkiss, 2000).

The frequency of antenatal care visits plays a vital for the mother’s health and outcome of pregnancy. Table 1 shows that only 39 percent of Pakistani women visited medical facilities for antenatal care at least three times during their latest pregnancy, merely 51 percent received at least two tetanus toxoid injections. Only 38 percent delivered the child at a health facility or by a health professional and only 24 percent utilized postnatal care. Moreover, there is a pronounced difference in the proportion of women who utilized maternal health services in rural and urban areas. Only 29 percent of women in rural areas had at least three antenatal visits during pregnancy as opposed to 56 percent in urban areas.

Table 1: Descriptive Statistics- Mean and Number of observations

Variable	Pakistan	Rural	Urban
Outcome Variables			
Antenatal Care			
At least three antenatal visits during pregnancy *	0.39 (4418)	0.29 (2890)	0.56 (1528)
At least two tetanus toxoid injections during pregnancy *	0.51 (4406)	0.45 (2887)	0.62 (1519)
Safe Delivery *	0.38 (4460)	0.29 (2914)	0.56 (1546)
Postnatal care *	0.24 (4475)	0.17 (2925)	0.38 (1550)
Individual Characteristics			
Age			
<25*	0.28 (4475)	0.29 (2925)	0.28 (1550)
25-34*	0.52 (4475)	0.50 (2925)	0.56 (1550)
35-49*	0.20 (4475)	0.21 (2925)	0.17 (1550)

Continued...

Variable	Pakistan	Rural	Urban
Education			
Illiterate*	0.71 (4475)	0.81 (2925)	0.52 (1550)
Primary but below middle*	0.09 (4475)	0.08 (2925)	0.11 (1550)
Middle but below secondary*	0.07 (4475)	0.05 (2925)	0.10 (1550)
Secondary and above*	0.13 (4475)	0.06 (2925)	0.27 (1550)
Literacy Skills*	0.34 (4475)	0.24 (2925)	0.53 (1550)
Health Knowledge*	0.48 (4461)	0.47 (2916)	0.50 (1545)
Mass Media Exposure*			
Heard Family Planning Message on radio or tv in last month	0.37 (4474)	0.30 (2924)	0.51 (1550)
Working Woman*	0.27 (4471)	0.31 (2924)	0.19 (1547)
Child's birth order			
1*	0.19 (4475)	0.19 (2925)	0.20 (1550)
2 to 3*	0.35 (4475)	0.32 (2925)	0.39 (1550)
4 to 6*	0.31 (4475)	0.32 (2925)	0.29 (1550)
7 +*	0.15 (4475)	0.17 (2925)	0.12 (1550)
Previous Fetal Loss or Still Birth*	0.22 (4475)	0.22 (2925)	0.23 (1550)
Previous Fetal Loss/Still Birth* Working Woman*	0.08 (4471)	0.09 (2924)	0.05 (1547)
Planned pregnancy *	0.74 (4475)	0.75 (2925)	0.71 (1550)

Continued...

Variable	Pakistan	Rural	Urban
Husband's education			
Illiterate*	0.41 (4475)	0.47 (2925)	0.71 (1550)
Primary but below middle*	0.11 (4475)	0.11 (2925)	0.11 (1550)
Middle but below secondary*	0.15 (4475)	0.15 (2925)	0.16 (1550)
Secondary and above*	0.32 (4475)	0.27 (2925)	0.44 (1550)
Husband has Skilled Employment*	0.53 (4474)	0.43 (2924)	0.72 (1550)
Spousal Discussion of Place of Delivery*	0.44 (4475)	0.35 (2925)	0.60 (1550)
Blood Relation with Husband*	0.52 (4471)	0.55 (2922)	0.46 (1549)
Wife of Household Head*	0.51 (4474)	0.51 (2924)	0.50 (1550)
Household Characteristics			
Household wealth (index)			
Low	-1.15 (840)	-1.156 (675)	1.1238 (165)
Medium-Low	-0.45 (839)	-0.44 (646)	-0.45 (193)
Medium	-0.008 (840)	-0.008 (587)	0.0062 (253)
Medium-High	0.39 (840)	0.3885 (487)	0.39 (343)
High	1.21 (840)	1.17 (366)	1.25 (472)
Number of household members	9.60 (4475)	9.96 (2925)	9.96 (1550)

Continued...

Variable	Pakistan	Rural	Urban
Community Characteristics			
Place of residence			
<i>Region</i>			
Urban *	0.35 (4475)	-	-
Rural*	0.65 (4475)	-	-
<i>Province</i>			
Punjab*	0.40 (4475)	0.40 (2925)	0.40 (1550)
Sindh*	0.29 (4475)	0.26 (2925)	0.34 (1550)
Khyber Pakhtunkhwa*	0.20 (4475)	0.21 (2925)	0.34 (1550)
Balochistan*	0.11 (4475)	0.12 (2925)	0.10 (1550)

Note: * = dummy variable, the mean represents the proportion of variable

Note: Number of observations are given in parenthesis

Source: Based on author's calculations

One of the aims of this study is to identify the direct and indirect mechanism through which education affects maternal health behavior of women. The descriptive statistics show that more than 70 percent of women from all over Pakistan are illiterate and only 13 percent reported to have received higher education. Among these, 81 percent of the illiterate women belong to rural areas and 52 percent belong to urban areas.

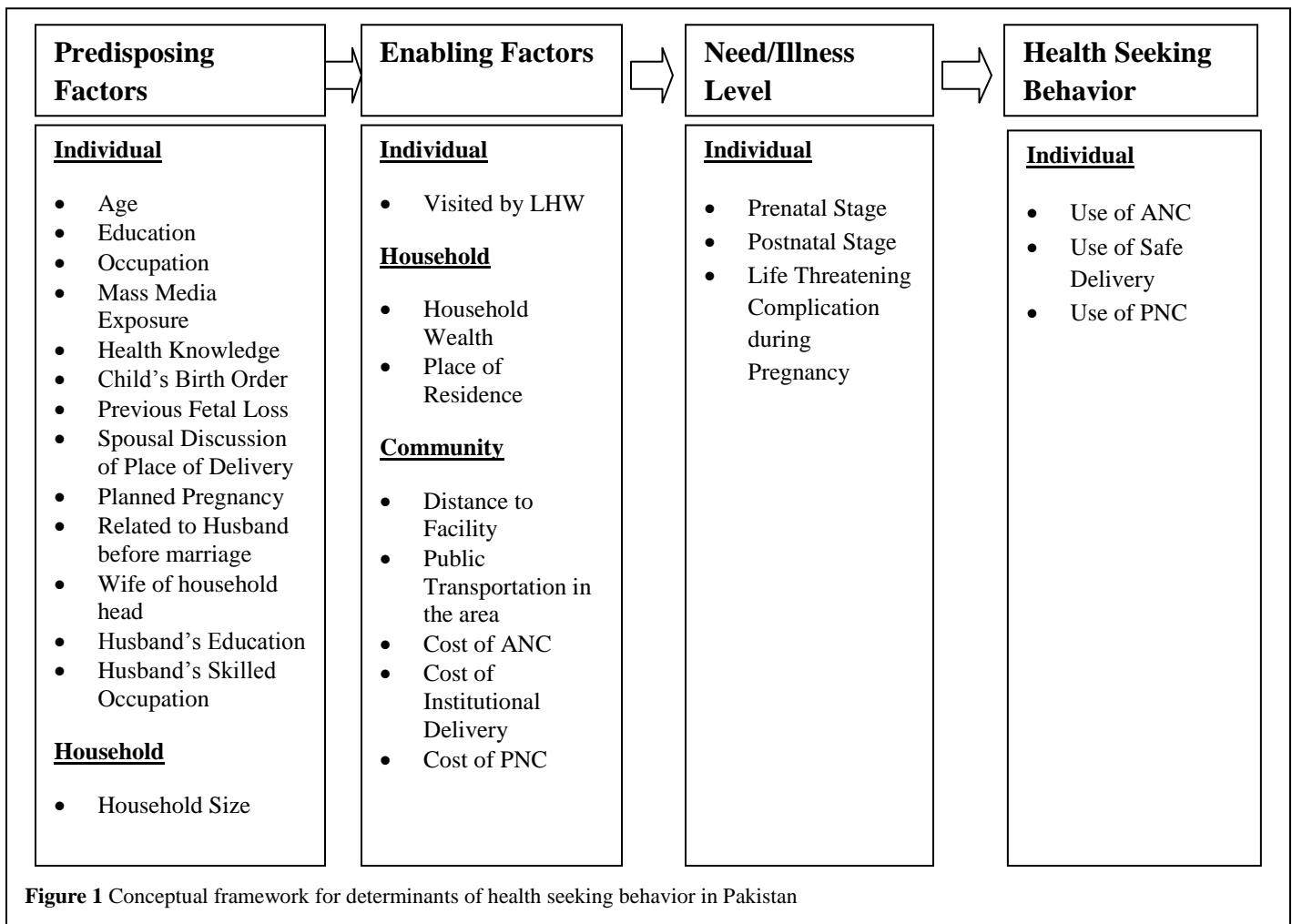
To assess literacy skills of women, this study use the results of a literacy test conducted as a part of PDHS to gauge the reading ability of women. Only 24 percent women of women from rural areas were able to read whole or part of a sentence as against 53 percent in urban areas.

Furuta & Salway (2006) established that female autonomy is not restricted to control over finances in Asian settings. The authors found that discussion of family planning with husbands had a significant effect on uptake of maternal health care by women. This study capture female empowerment by using the data on spousal discussion of place of delivery of the last child as a proxy. The descriptive statistics show that women in urban areas of Pakistan are more likely to have discussions with their husbands and are therefore more empowered as compared to their rural counterparts.

To determine women's health knowledge, this study uses a series of questions asked in PDHS, to assess women's awareness regarding problems associated with pregnancies. Less than 50% of the women were aware of problems associated with pregnancy. Interestingly, there is not a pronounced difference between health knowledge of rural and urban women. Glewwe (1999), Kovsted et al. (2002) and Aslam & Kingdon (2012) attempted to study the how child health is affected by mother's health knowledge. They treated health knowledge as an endogenous variable and used instrumental variable approach to account for the feedback effect. However, determining the impact woman's health knowledge has on her maternal health behavior is a relatively new approach in maternal health literature.

4. Conceptual Framework and Estimation Strategy

This study draws on the Behavioral model proposed by Anderson (1968) and its modifications. According to the model, a household's medical care practices are based on the interplay of its predisposing, enabling and need factors (Anderson, 1995). The health seeking behavior is therefore, "a sequential and conditional function of an individual's predisposition to use health services, their perceived need to use them and their ability to obtain these services" (Amin et al. 2010, p. 11). The actual utilization of health care is triggered by the need during prenatal and postnatal stages. However, due to data unavailability, this study only explores the extent to which predisposing and enabling factors affect maternal health behavior.



Source: (Amin, Shah, & Becker, 2010)

To identify the socioeconomic determinants of maternal healthcare behavior among currently married women in Pakistan, we begin with a simple model:

$$MHB_i = \beta_0 + \sum \alpha I_i + \sum \phi H_j + \sum \gamma C_c + \varepsilon_i \quad (1)$$

Where MHB_i is Maternal health seeking behavior of a woman denoted by i , I_i represents Individual characteristics of a woman i , H_j is Household characteristics of a j^{th} household and C_c represent Community characteristics of community c .

4.1 Variable Description

MHB is the outcome variables of interest. According to the recommendations of WHO (2006), the following components, combined, constitute as complete maternal health care.

Table 2: List of Dependant Variables

Maternal Health Behavior (MHB)	
Antenatal Care	Dummy variable = 1 if woman had at least three antenatal visits; =0 otherwise
	Dummy variable=1 if woman had a minimum of two tetanus toxoid injections; = 0 otherwise
Safe Delivery	Dummy Variable =1 if delivery was conducted at a health facility or at home by a doctor/nurse/Lady Health Visitor/Auxiliary Nurse/Midwife/other health professionals; =0 otherwise
Postnatal Care	Dummy variable = 1 if trained postnatal care was obtained within 42 days of delivery; =0 otherwise

Antenatal care is not complete unless women are protected from unhygienic practices and other risks via Tetanus Toxoid injections. Number of visits to a health care facility is an important factor because by frequently visiting health facilities, women come in direct contact with health professionals and develop a rapport with them. Together, these components constitute as complete antenatal care.

4.2 Specification Issues and their Solutions

Simple OLS estimation can result in biased estimates for several reasons. Firstly, some individual level characteristics of women can have a simultaneous relation with their decision to seek maternal health care, resulting in an endogeneity problem. Secondly, based on the availability of data, there are some community characteristics, such as cultural values, preferences and quality of infrastructure, which are unobservable and cannot be controlled by covariates included in the analysis.

4.2.1 Potentially Endogenous Variable

A potential problem with equation (1) is that it assumes women's education to have a direct effect on maternal health seeking behavior of women. Women's schooling can influence maternal health seeking behavior by improving their ability to process information efficiently. They acquire this ability through the cognitive skills, such as literacy or numeracy skills, learned at school. Conversely, acquisition of health knowledge is not restricted to the time period a woman is enrolled in school. Literacy and numeracy skills acquired at school can increase women's health knowledge even after leaving school (see Thomas et al. 1991; Glewwe, 1999; Aslam & Kingdon, 2012). This study will capture the direct and indirect effect both, by adding the following pathways of education as control variables;

(i). Education \longrightarrow Literacy skills \longrightarrow Maternal Health Behavior

(ii). Education \longrightarrow Literacy skills \longrightarrow Health Knowledge \longrightarrow Maternal Health Behavior

Literacy skills acquired at school enables women to assess and assimilate information successfully and increase their health knowledge which affects their health seeking behavior (see Glewwe, 1999).

Maternal health knowledge is itself a potentially endogenous variable. While health knowledge helps in identifying the need of utilization of maternal health services, women who seek health care are likely to have more health knowledge. Thus the causality runs in both directions.

This endogeneity issue can be resolved by using instrumental variable technique. Ideally, the instrument, Z_i should contain covariates that has a strong explanatory power for the specific endogenous variable but no correlation with ε . That is $Cov(X_i, Z_i) \neq 0$ and $Cov(\varepsilon_i, Z_i) = 0$.

An important source of information and health knowledge for women, identified by the literature, is their exposure to mass media (see Thomas, Strauss, & Henriques, 1991; Glewwe 1999; LeVine, 2004; Aslam & Kingdon 2012). This study will instrument for health knowledge by using the variable “mass media exposure” as an instrumental variable.

Fortunately, along with information on the ownership of radio or television by a household, PDHS (2006-07) has extensive information on the type of message delivered to women by radio or television. Based on the availability of such factors, this study considers a woman exposed to mass media only if she reported having “heard a family planning message on radio or television last month”. The intuition for using this type of measure mass media exposure as an instrument is that it increases awareness among women, improves their health knowledge and affects their health seeking behavior.

The instrument is informative because listening to a family planning message on radio or television is unlikely to affect women’s health seeking behavior through any other mechanism but increasing their health knowledge. Moreover, it is highly improbable that, women would

listen to family planning messages on radio or television because they received maternal health care. This makes mass media exposure a valid instrument

4.2.2 Omitted Variable Problem

Short run fluctuation in a household's resources, represented by household's income or income per capita is an important determinant of ability and willingness of a household to pay for maternal health care services. Following the pattern of USAID-sponsored Demographic and Health Surveys, PDHS (2006-07) does not have any information on household income. However the data set has extensive information on ownership of household assets.

Based on the literature and availability of factors in data, household income can be controlled by using wealth index (an index of durable assets owned by the household) as an independent variable. For the purpose of analysis, we constructed a wealth index comprising of household assets and housing conditions by using Principal Component Analysis³. PCA allows to rank individuals on the basis of their "household scores and divide them in different quintiles, each representing 20 percent of the score between 1 (poorest) and 5 (wealthiest)" (Singh et. al, 2012).

Apart from the assets mentioned in ³, household's ownership of radio or television is not included in the wealth index. This is because data shows there is a strong correlation between households that own either a radio or television and women who have heard a family planning message on radio or television. For instance, table 3 shows that 90 percent of women from households that own a television reported listening to a family planning message last month. Therefore including the ownership of these consumer durables will decrease explanatory power

³ The wealth index is constructed by using following variables: material used to construct roof, walls and flooring, type of sanitation facilities and cooking fuel available, availability of electricity and ownership status of the house; and ownership of consumer durables like cooler, air conditioner, refrigerator, bicycle, motorcycle, scooter, car, truck, telephone, washing, machine, water pump, sewing machine, computer, bed, chairs, cabinets, sofa, camera.

of the endogenous variable, since mass media exposure of women would no longer be an informative instrument.

Table 3: Proportion of women from households that own radio or television

Ownership Status of Household	Number	Percentage
Owens a television	1421	90.68
Does not own a television	146	9.32
Owens a radio	616	39.39
Does not own a radio	948	60.61

Source: Based on Author's Calculations

This study also uses women’s spouse’s educational attainment and occupation as independent variables. These covariates closely reflect earnings of women’s spouses and control for the relative socioeconomic status of a household.

Community level covariates, such as quality of local health infrastructure, cannot be included in the model due to data unavailability. Nevertheless, these are important determinants of health care utilization and can result in biased coefficients if they are not controlled for. Another concern is that Elo (1992) identified that better educated women might belong to a particular community that has more schools for instance. This can confound the relation between women’s education and their health seeking behavior.

To eliminate omitted variable bias caused by community characteristics, a cluster fixed effects model will be estimated. The fixed effects will be conducted at cluster level because fixed effects at a smaller level will eliminate all the characteristics common to women in a single cluster and cannot cause omitted variable bias.

4.3 Estimation Strategy

Given that the predicted probabilities of outcome variables are bound between 0 and 1, the empirical strategy to assess the impact of socioeconomic determinants on uptake of maternal health services is a Probit model. Due to the potential endogeneity of health knowledge, the Probit model will be estimated with the instrumental variable technique (IV).

The first stage of the two stage least square (2SLS) will involve Ordinary Least Square (OLS) to predict the probability of health knowledge. The second stage will be a Probit model, based on the binary dependent variables.

Stage 1:

$$Health\ Knowledge_i = \psi_0 + \Sigma\alpha I_i + \Sigma\phi H_j + \Sigma\gamma C_c + \lambda Mass\ Media\ Exposure_i + \varepsilon_i \quad (2)$$

Stage 2:

$$MHB_i = \beta_0 + \Sigma\alpha \widehat{I}_i + \Phi Health\ \widehat{Knowledge}_i + \Sigma\phi H_j + \Sigma\gamma C_c + \varepsilon_i \quad (3)$$

Vector I captures the individual level characteristics while a household's environment is captured by vector H . C represents community characteristics, Health Knowledge is the endogenous variable and Mass Media Exposure is the instrumental variable. The selection of these variables is drawn from the choice of variables in the literature and their availability in PDHS 2006-2007.

In addition to this model, a fixed-effects Logit model is also estimated.

$$MHB_{ic} = \beta_0 + \Sigma\alpha I_i + \Sigma\phi H_j + \theta_c + \varepsilon_{ic} \quad (4)$$

Equation (4) represents fixed effects at cluster level (primary sampling unit). This model will control for distances to health facility and quality of local health infrastructure as well as other unobservable heterogeneity within sampling units, which cannot be controlled by covariates included in the analysis. The variable θ_c captures the unobserved heterogeneity constant across communities. It captures all unobserved factors, constant among sampling units, that affect maternal health seeking behavior (Wooldridge, 2002).

5. Results and Empirical Findings

The study's objective is to identify the determinants of maternal health seeking behavior of women in Pakistan, using cross-sectional data from PDHS 2006-07.

The econometric specification followed in this paper uses all the possible variables mentioned in Figure 1 that could affect maternal health seeking behavior of women in Pakistan. In the first stage of the two step Probit model, the endogenous covariate is regressed on the instrumental variable using simple OLS technique (see Table A-1 in the Appendix). Note that this first stage remains the same for all the dependent variables mentioned in the previous section. To establish that mass media exposure is an informative instrument, Angrist-Prischke F-test is also conducted. The first stage F-statistic turned out to be 25.30, greater than 10, rejecting the null hypothesis of no explanatory power of the instrumental variable. Moreover, significant coefficient of instrumental variable in the first stage regression indicates that mass media exposure has a strong influence on women's health knowledge.

The second stage, based on Probit model, uses the predicted endogenous covariate obtained from the first stage, as an explanatory variable, along with other individual and household level characteristics of women to identify factors that determine their maternal health care utilization. The estimations are conducted on the overall Pakistan data, controlling for regional and provincial differences between the three provinces of Punjab, Sindh and KPK⁴. Further, to control for community specific factors such as quality of local health infrastructure, estimations are performed using cluster fixed effects as well. All estimations are controlled for heteroskedasticity of unknown form by implementing robust standard errors at the cluster level.

⁴ Balochistan province has been excluded due to of data constraints.

The explanatory variables have been classified into three categories; (i) individual characteristics, (ii) household characteristics, and (iii) community characteristics. Women's individual characteristics, their household characteristics and community characteristics are separately regressed on four binary dependent variables; minimum three antenatal visits to a health care facility (Yes = 1, No = 0), receiving at least two tetanus toxoid inoculations(Yes = 1, No = 0), receiving safe delivery(Yes = 1, No = 0) and receiving postnatal care(Yes = 1, No = 0).

The results for the second stage of IV-Probit model are discussed below.

5.1. Second Stage Results

Table 4 reports the estimated parameters of overall Pakistan for each outcome variable. This model addresses the endogeneity problem of reverse causality. The probability derivatives or marginal effects of these estimated parameters are reported in table A-2. These probability derivatives indicate per unit change in independent variable and its effect on the probability of outcome, after controlling all other factors.

Signs of the majority of variables are consistent with the literature on maternal health seeking behavior of women.

Table 4: Probit Results for Maternal Health Care Utilization Behavior of Women in Pakistan

Explanatory Variables	ANI CARE	ANTENATAL CARE	SAFE DELIVERY	POSTNATAL CARE
	Minimum 3 Antenatal Visits to a Health Facility	At least two Tetanus Toxoid Injections	Gave birth at a health facility/by trained health service providers	Received trained postnatal care
Individual Characteristics				
Age				
<25 (reference)				
25-34	0.0904 (0.0595)	-0.0359 (0.0577)	0.0823 (0.0590)	0.0800 (0.0626)
35-49	0.333*** (0.0875)	0.219*** (0.0824)	0.360*** (0.0824)	0.221** (0.0879)
Education				
Illiterate (reference)				
Primary but below middle	0.372*** (0.0782)	0.472*** (0.0782)	0.324*** (0.0770)	0.233*** (0.0821)
Middle but below secondary	0.499*** (0.0872)	0.563*** (0.0899)	0.449*** (0.0868)	0.337*** (0.0862)
Secondary and above	0.526*** (0.0885)	0.440*** (0.0877)	0.683*** (0.0866)	0.424*** (0.0851)
Health Knowledge	3.984*** (0.528)	4.353*** (0.538)	1.684*** (0.555)	1.987*** (0.580)
Working Woman	-0.620*** (0.0940)	-0.668*** (0.0946)	-0.385*** (0.0969)	-0.385*** (0.104)

Table 4: Probit Results for Maternal Health Care Utilization Behavior of Women in Pakistan

Explanatory Variables	ANTENATAL CARE		SAFE DELIVERY	POSTNATAL CARE
	Minimum 3 Antenatal Visits to a Health Facility	At least two Tetanus Toxoid Injections	Gave birth at a health facility/by trained health service providers	Received trained postnatal care
Child's birth order				
1 (reference)				
2 to 3	-0.432*** (0.0705)	-0.252*** (0.0622)	-0.279*** (0.0668)	-0.234*** (0.0706)
4 to 6	-0.573*** (0.0852)	-0.406*** (0.0808)	-0.504*** (0.0828)	-0.371*** (0.0853)
7 +	-0.896*** (0.117)	-0.709*** (0.106)	-0.583*** (0.118)	-0.558*** (0.127)
Previous Fetal Loss or Still Birth	-0.363*** (0.0872)	-0.439*** (0.0827)	-0.137 (0.0857)	-0.162* (0.0852)
Previous Fetal Loss/Still Birth* Working Woman	0.384*** (0.115)	0.206* (0.118)	0.233** (0.116)	0.122 (0.129)
Planned pregnancy	0.0727 (0.0662)	0.318*** (0.0640)	0.126* (0.0668)	0.215*** (0.0716)

Table 4: Probit Results for Maternal Health Care Utilization Behavior of Women in Pakistan

Explanatory Variables	ANTENATAL CARE		SAFE DELIVERY	POSTNATAL CARE
	Minimum 3 Antenatal Visits to a Health Facility	At least two Tetanus Toxoid Injections	Gave birth at a health facility/by trained health service providers	Received trained postnatal care
Husband's education				
Illiterate (reference)				
Primary but below middle	-0.0485 (0.0766)	-0.0122 (0.0735)	0.120 (0.0757)	0.0604 (0.0816)
Middle but below secondary	0.150** (0.0696)	0.139** (0.0668)	0.123* (0.0672)	0.0961 (0.0761)
Secondary and above	0.249*** (0.0609)	0.200*** (0.0593)	0.253*** (0.0598)	0.279*** (0.0619)
Husband has Skilled Job	0.226*** (0.0502)	0.127** (0.0499)	0.0169 (0.0516)	0.0983* (0.0563)
Spousal Discussion of Place of Delivery	0.157** (0.0681)	-0.0729 (0.0701)	0.342*** (0.0700)	0.353*** (0.0745)
Blood Relation with Husband	-0.178*** (0.0479)	-0.0659 (0.0461)	-0.0517 (0.0476)	-0.00522 (0.0518)
Wife of Household Head	-0.117** (0.0550)	-0.183*** (0.0504)	-0.147*** (0.0553)	-0.159*** (0.0603)

Table 4: Probit Results for Maternal Health Care Utilization Behavior of Women in Pakistan

Explanatory Variables	ANTENATAL CARE		SAFE DELIVERY	POSTNATAL CARE
	Minimum 3 Antenatal Visits to a Health Facility	At least two Tetanus Toxoid Injections	Gave birth at a health facility/by trained health service providers	Received trained postnatal care
Household Characteristics				
Household wealth (index)	0.139*** (0.0309)	0.0461 (0.0319)	0.179*** (0.0316)	0.140*** (0.0329)
Number of household members	-0.00941* (0.00524)	-0.00703 (0.00503)	-0.00950* (0.00547)	-0.00682 (0.00521)
Community Characteristics				
Place of residence				
<i>Region</i>				
Urban (reference)				
Rural	-0.245*** (0.0565)	-0.0929 (0.0575)	-0.312*** (0.0611)	-0.268*** (0.0617)
<i>Province</i>				
Punjab (reference)				
Sindh	-0.756*** (0.149)	-1.244*** (0.153)	-0.0701 (0.161)	-0.110 (0.165)
Khyber Pakhtunkhwa	-0.0514 (0.0668)	-0.0267 (0.0743)	0.172** (0.0790)	-0.102 (0.0823)
Constant	-1.491*** (0.194)	-1.350*** (0.193)	-0.934*** (0.207)	-1.658*** (0.222)
Number of Observations	4133	4125	4172	4186

Notes: * = $p < 0.10$, ** = $p < 0.05$, *** = $p < 0.01$.

Robust standard errors at cluster level are given in the parenthesis below estimates.

Source: Author's calculations

Females' own characteristics include her age, categorized as age cohorts. Column 1 suggests that probability of women aged 35-49 visiting a health care facility at least three times for antenatal care is greater than less than 25 years old women. Similarly, women aged 35-49 have a greater probability of receiving at least two tetanus inoculations during pregnancy, safe delivery care and postnatal care as compared to women less than 25 years of age.

The coefficients for different categories of women's educational attainment show that women with middle and higher education have a greater probability of visiting a health care facility for antenatal care at least three times during pregnancy as compared to uneducated women, *ceteris paribus*. Interestingly, women who have formal education but did not complete education up to middle level also have a greater probability of at least three antenatal visits. These results remain consistent for other aspects of maternal health seeking behavior such as tetanus inoculations, safe delivery and postnatal care. This implies that all levels of education have a significantly positive effect on maternal health seeking behavior of women.

As mentioned in section 4, women's education has an indirect effect on their maternal health seeking behavior. Formal schooling enables women to assess and assimilate information efficiently which increases their health knowledge and thus affect the outcome variable. Therefore, health knowledge itself is an important explanatory variable of health seeking behavior. By controlling for education, this study intends to isolate the impact of women's health knowledge on their health seeking behavior. The positive and statistically significant coefficient of health knowledge variable for all outcome variables supports this hypothesis, implying that women who are more aware about issues and complications during pregnancy have a higher probability of seeking maternal health care (shown by Columns 1, 2, 3 and 4 of

Table 3). It is interesting to note that health knowledge has a more pronounced effect on complete antenatal care utilization than safe delivery and postnatal care.

Prior literature has established that employment status of women is associated with their empowerment and better health care seeking behavior. Contrary to the existing literature, the results show that working women have a less probability of seeking antenatal care as compared to women who are not working. However, this can be attributed to the nature of data. Firstly, according to table 1, approximately 27 percent women of the total sample are working. Out of those women who are working, 79.5 percent women are illiterate which translates into lower earnings. Secondly, of all the women who are working, 38% belong to the least wealthy households and only 7 percent of working women belong to households with highest wealth (see Table 5). Such numbers show that majority of the women who are working belong to less affluent households.

Table 5: Proportion of working women with respect to their socioeconomic status

WEALTH	WOMEN WORKING		WOMEN NOT WORKING	
	Number	Percentage	Number	Percentage
Low	338	38%	502	17%
Medium Low	250	25%	587	20%
Medium	247	17%	593	20%
Medium High	181	12%	659	21%
High	127	7%	709	21%

Source: Based on Author's Calculations

Table 6 reiterates this by showing that out of the 27 percent women who are working, only 14 percent have a skilled job while 86 percent are working as low paid, unskilled workers.

The estimations are therefore picking up the effect of working women with fewer earnings, who belong to poor households and cannot afford to seek healthcare.

Table 6: Nature of occupation of working women

Occupational Categories	Number	Percentage
Agricultural	479	10.7
Household & Domestic	31	0.69
Skilled/Unskilled Manual	115	2.57
Sales & Services	517	11.55
Professor etc.	68	1.52
Total	1142	27.03

Source: Based on Author's Calculations

With respect to child's birth order, the coefficients of columns 1, 2, 3 and 4 for all birth orders show that women expecting their first child have a greater probability of paying at least three visits for antenatal care as compared to higher birth order. Interestingly, this effect becomes large for all components of maternal health care as birth order increases. This is in accord with the literature and suggests that women with higher number of children tend to attach less importance to current pregnancy.

Contrary to findings of existing literature on maternal health seeking behavior, the results indicate that women with a previous fetal loss or still birth have less likelihood of receiving antenatal care, tetanus inoculations and postnatal care as compared to women with no maternal history. Estimated parameters reported in column 3 shows that whether a woman has a history of previous fetal loss or still birth does not have any effect of her probability of receiving safe delivery. However when this variable is interacted with women who are working, the coefficient

becomes positive and statistically significant, for antenatal visits, tetanus inoculations and safe delivery. The interaction term was constructed to gauge the impact of maternal history along with socioeconomic status of a household on outcome variables. These results indicate that a woman's probability of visiting health facility for antenatal care at least three times during pregnancy, receiving tetanus inoculations and safe delivery care utilization is higher if she is a working woman and has experienced previous fetal loss or still birth, keeping all other factors constant.

The literature suggests that women going through a planned pregnancy are more cautious and tend to attach importance to the child. The results for the variable planned pregnancy supports the literature as it has a positive and significant effect on tetanus inoculations, utilization of safe delivery and postnatal care by women. This implies that a woman facing a planned pregnancy has a higher probability of receiving maternal health care as compared to a woman going through unexpected pregnancy.

Husband's education has been hypothesized to be a reflection of economic well-being of the household as it translates into higher earnings. At the same time, husband's education reflects his perceptions and preferences towards modern medicine. Since primary education is not sufficient to ensure neither higher earnings nor modification in tastes, its coefficient is statistically insignificant for all the outcome variables. However women with spouses educated at least up to middle or higher levels of education are more likely to seek maternal health care as compared to women with illiterate spouses. These results are consistent with the literature that higher household income increases the probability of women seeking maternal health care.

Another proxy for household's economic well being is whether a woman's spouse has skilled employment⁵ or not. The effect of this variable is consistent with the literature since it shows that probability of seeking antenatal care at least three times during pregnancy, receiving a minimum of two tetanus inoculations and postnatal care is higher for a woman whose spouse has a skilled employment as compared to those whose husband's have unskilled job. However, the results for safe delivery care reveal a different finding pattern. A woman whose spouse has a skilled job does not have any influence on the probability of woman's likelihood of receiving safe delivery care.

Ability of a woman to take important decisions and influence her personal environment has emerged as a strong determinant of maternal health behavior in the literature (see Furuta & Salway, 2006; Mumtaz & Salway, 2007; Hou & Ma, 2011). However, in Asian settings, family structures are usually complex since most of the women live in a joint family system; therefore a woman as an independent decision maker is not true measure of her autonomy. This study uses spousal discussion of place for delivery as a proxy for empowerment. Spousal discussion has a positive and significant effect on minimum three antenatal visits, safe delivery and postnatal care received by women implying that women involved in discussion and decision making process have a higher probability of seeking maternal health care, after controlling for all other individual and household characteristics. Conversely, spousal discussion of place of delivery does not influence women to take at least 2 tetanus inoculations. This can be attributed to the fact that households visited by a lady health worker can receive inoculations at their door step for which women do not necessarily need to have a discussion with their spouses. However, due to data constraints, this cannot be captured by the covariates included in the analysis.

⁵ Following the methodology of Celik & Hotchkiss (2000), professional, clerical, sales, services and skilled manual work are considered as skilled based jobs for spouses.

In a typical South Asian setting, decision making authority is often delegated to household heads or their spouse. The variable “wife of household head” is therefore added in the analysis to capture effect of this type of empowerment on woman’s health seeking behavior. Contrary to expectations, being the wife of the household head has a negative influence on woman’s probability of visiting health care facility at least three times during pregnancy. Effect of this variable remains the same on other aspects of maternal health too. The significant and negative coefficients imply that after controlling for all other factors, the wife of a household head has less probability of receiving at least three antenatal visits, minimum two tetanus inoculations, safe delivery and postnatal care as compared to a woman who is not the household head’s spouse.

Consanguineous marriages are very common in Pakistani culture and are often associated with better treatment of women by her husband and in-laws. However, results of table 3 bear interesting findings with respect to this variable given that 52 percent women of the working sample are married to their cousins. Controlling for other factors, women married to their first cousins, either maternal or paternal, have less probability of seeking antenatal care as compared to those who are not married to their cousins. Interestingly, consanguinity does not have any influence on other outcome variables; at least two tetanus toxoid shots, safe delivery and postnatal care.

Variables household wealth and number of household members were included into the models to capture the household well-being. Another measure of economic status of a household is wealth. A wealth index comprising household conditions and its ownership status of durable assets is created using principal component analysis. The coefficient shows that, *ceteris paribus*,

women who belong to wealthier households have a greater probability of receiving maternal health care.

The coefficient for number of household members for minimum three antenatal visits and safe delivery care utilization are negative, showing that being a part of a large household has a strong adverse impact on women's antenatal care and safe delivery care utilization. This finding is in accord with the literature which suggests that women from larger households have less decision making authority and are subject to more congestion and stretch of scarce resources as compared to women with few household members (see Shariff & Singh, 2002; Mumtaz & Salway, 2007; and Singh et al., 2012). However, size of a household has no influence on probability of a woman receiving tetanus inoculations. Unlike other maternal health seeking practices, tetanus inoculations might not require mobility. If a woman is visited by lady health workers, she is more likely to receive tetanus inoculations as compared to woman who is not visited by lady health workers. Unfortunately, there is not enough data in PDHS to investigate behavioral difference in maternal health seeking, caused by services delivered by lady health workers.

The results of table 4 show that women residing in rural areas are less likely to receive maternal health care as compared to their urban counterparts. These are not surprising results because urban areas of Pakistan have greater access to health care facilities as compared to rural areas of the country. However, there is no significant difference between rural and urban women's probability of receiving at least two tetanus inoculations. At the provincial level, women of province of Sindh have a smaller probability of receiving complete antenatal care as compared to women of Punjab. Utilization of safe delivery care by women of KPK is less as compared to women in Punjab, after controlling for all other factors. Interestingly, there is not

any significant variation among women of Punjab and KPK in terms of receiving complete antenatal care and postnatal care. It is interesting to note that KPK is doing worse than Punjab in terms of maternal health seeking behavior, followed closely by Sindh.

5.2. Community Fixed Effects

Socioeconomic conditions of an area, cultural factors as well as community specific characteristics such as distance to health facility, availability of public transport or quality of local health infrastructure also have an effect on variable of interest and the outcome variable. However, based on availability of factors in PDHS, these characteristics cannot be included in the analysis. Moreover, there is growing evidence in the literature that community specific characteristics, such as number of schools within a community, might have an effect on women's educational attainment as well as their spouses' education. This is either because highly educated men and women belong to a region with better socioeconomic conditions or because educated people are more likely to migrate to areas with better economic opportunities than less educated people.

To address this issue of omitted variable and isolate the impact of education, community fixed effects at cluster level are used in this analysis. On average there are about 10 to 15 households located within a primary sampling unit. It is important to note that households within a primary sampling unit are located in the same vicinity so this fixed effects accounts for the observable and unobservable characteristics, which cannot be included in the model, to a large extent.

Table 7 provides the fixed effects estimates at cluster level, for maternal health seeking behavior of women. In the case of minimum three antenatal visits to a health facility, the effect

of all levels of women's education remains significant. However, there is a substantial decline in coefficient size, indicating that the cluster specific characteristics had a somewhat pronounced effect on women's education in IV-Probit model. Similarly, effect of all levels of education remain significant, but decline significantly for safe delivery care and postnatal care utilization once cluster specific characteristics are controlled for via fixed effects. With respect to at least two tetanus inoculations, there is a lack of behavioral difference between uneducated women and those with complete primary schooling. This implies that once cluster specific factors are controlled for, women's education up to primary level has no influence on tetanus inoculations received by them. With respect to higher levels of education, women who have completed education up to middle or higher education are more likely to receive tetanus toxoid injections as compared to uneducated women. However, the magnitude of the effect is substantially lower than simple IV-Probit model.

Table 7: Cluster Fixed Effects for Maternal Health Care Utilization Behavior of Women in Pakistan

Explanatory Variables	ANTENATAL CARE		SAFE DELIVERY	POSTNATAL CARE
	Minimum 3 Antenatal Visits to a Health Facility	At least two Tetanus Toxoid Injections	Gave birth at a health facility/by trained health service providers	Received trained postnatal care
Individual Characteristics				
Age				
<25 (reference)				
25-34	0.00897 (0.0279)	-0.0110 (0.0308)	0.00725 (0.0232)	0.0144 (0.0207)
35-49	0.0521 (0.0376)	0.0167 (0.0413)	0.0779** (0.0313)	0.0363 (0.0281)
Education				
Illiterate (reference)				
Primary but below middle	0.0920*** (0.0357)	0.0639 (0.0395)	0.0802*** (0.0296)	0.0464* (0.0265)
Middle but below secondary	0.0952** (0.0407)	0.104** (0.0450)	0.144*** (0.0340)	0.0802*** (0.0304)
Secondary and above	0.0794* (0.0417)	0.0800* (0.0453)	0.163*** (0.0341)	0.103*** (0.0304)
Health Knowledge	0.812*** (0.257)	0.942*** (0.287)	0.388* (0.212)	0.378** (0.189)
Working Woman	-0.0639** (0.0292)	-0.0518 (0.0317)	-0.0663*** (0.0238)	-0.0630*** (0.0213)

Table 7: Cluster Fixed Effects for Maternal Health Care Utilization Behavior of Women in Pakistan

Explanatory Variables	ANTENATAL CARE		SAFE DELIVERY	POSTNATAL CARE
	Minimum 3 Antenatal Visits to a Health Facility	At least two Tetanus Toxoid Injections	Gave birth at a health facility/by trained health service providers	Received trained postnatal care
Child's birth order				
1 (reference)				
2 to 3	-0.104*** (0.0276)	-0.0700** (0.0304)	-0.0736*** (0.0229)	-0.0602*** (0.0205)
4 to 6	-0.166*** (0.0348)	-0.139*** (0.0387)	-0.156*** (0.0291)	-0.0941*** (0.0260)
7 +	-0.218*** (0.0454)	-0.194*** (0.0500)	-0.138*** (0.0378)	-0.0998*** (0.0337)
Previous Fetal Loss or Still Birth	-0.0379 (0.0313)	-0.0428 (0.0345)	-0.0116 (0.0262)	-0.0105 (0.0235)
Previous Fetal Loss/Still Birth* Working Woman	0.0748 (0.0504)	0.00330 (0.0557)	0.0517 (0.0418)	-0.00291 (0.0375)
Planned pregnancy	-0.0160 (0.0240)	0.0696** (0.0271)	0.0303 (0.0202)	0.0421** (0.0179)

Table 7: Cluster Fixed Effects for Maternal Health Care Utilization Behavior of Women in Pakistan

Explanatory Variables	ANTENATAL CARE		SAFE DELIVERY	POSTNATAL CARE
	Minimum 3 Antenatal Visits to a Health Facility	At least two Tetanus Toxoid Injections	Gave birth at a health facility/by trained health service providers	Received trained postnatal care
Husband's education				
Illiterate (reference)				
Primary but below middle	-0.0577* (0.0333)	-0.0258 (0.0362)	0.00177 (0.0274)	-0.00683 (0.0246)
Middle but below secondary	0.0263 (0.0311)	0.0208 (0.0350)	0.0214 (0.0261)	0.0104 (0.0233)
Secondary and above	0.0650** (0.0274)	0.0609** (0.0303)	0.0791*** (0.0228)	0.0929*** (0.0204)
Husband has Skilled Employment	0.0390* (0.0221)	0.00171 (0.0245)	-0.0179 (0.0182)	0.00329 (0.0163)
Spousal Discussion of Place of Delivery	0.0944*** (0.0281)	0.0147 (0.0312)	0.121*** (0.0229)	0.108*** (0.0203)
Blood Relation with Husband	-0.0116 (0.0189)	0.0242 (0.0209)	0.0149 (0.0158)	0.0197 (0.0141)
Wife of Household Head	0.00425 (0.0226)	-0.0125 (0.0248)	-0.0416** (0.0187)	-0.0333** (0.0167)

Table 7: Cluster Fixed Effects for Maternal Health Care Utilization Behavior of Women in Pakistan

Explanatory Variables	ANTENATAL CARE		SAFE DELIVERY	POSTNATAL CARE
	Minimum 3 Antenatal Visits to a Health Facility	At least two Tetanus Toxoid Injections	Gave birth at a health facility/by trained health service providers	Received trained postnatal care
Household Characteristics				
Household wealth (index)	0.0314** (0.0135)	0.0171 (0.0150)	0.0328*** (0.0113)	0.0235** (0.00998)
Number of household members	-0.00108 (0.00215)	0.00357 (0.00238)	-0.00164 (0.00179)	-0.00192 (0.00161)
Number of Observations	4054	4046	4094	4108
Adjusted R-squared	-0.778	-1.080	-0.318	-0.319

Notes: * = $p < 0.10$, ** = $p < 0.05$, *** = $p < 0.01$.

Robust standard errors at cluster level are given in the parenthesis below estimates

Source: Author's calculations

In terms of effect of husband's education on women's maternal health seeking behavior, the fixed effects model exhibits some interesting findings. The effect of all levels of education, except secondary and higher education become insignificant once community specific characteristics are controlled for. While the effect of education completed up to secondary or higher level remains significant on maternal health seeking behavior, there is a substantial decline in the size of this effect. An unexpected finding is that once cluster specific factors are controlled for, a woman whose spouse has completed primary education only is less likely to visit health care facility for antenatal care thrice as compared to a woman whose spouse is uneducated.

These results indicate that effects of education were confounded due to observable and unobservable heterogeneity among sampling units. However, the fixed effects model has purged the variables of such heterogeneity.

The fixed effects models also indicate that prior to controlling for cluster specific characteristics, the coefficient of health knowledge was also attenuated. Table 7 shows that while the effect of women's health knowledge on their maternal health seeking behavior remains significant, there has been a sharp decline in the magnitude of this influence.

Table 7 exhibits that once heterogeneity within a sampling unit is controlled for, there is no difference between maternal health seeking behavior of older and younger women, except for safe delivery care utilization. Similarly, maternal history of women has no influence on maternal health care utilization behavior of women of Pakistan. The probability of women seeking safe delivery care utilization is not influenced by the fact that the woman's pregnancy is planned or mistimed. This implies that the effect of planned pregnancy utilization of safe delivery care by

women was indeed confounded by area specific characteristics. Once these characteristics are controlled for, women are inclined to use maternal health care services, irrespective of whether the pregnancy is planned or unplanned, due to risks associated with childbirth. The fixed effects models also exhibit that women who are spouse of household head are less likely to receive safe delivery and postnatal care utilization. Another notable finding is that consanguineous marriages has absolutely no influence on maternal health seeking behavior of women, once cluster specific characteristics are controlled for.

Another notable finding of fixed effects model is that the heterogeneity within sampling units seems to have the most confounding effect on tetanus inoculation received by pregnant women in Pakistan. The results of cluster fixed effects show that women's age, primary schooling or employment status, previous fetal loss or still birth, spouse's employment status have no influence on the probability of women receiving tetanus inoculations.

5.3. Robustness Checks

In order to verify the results obtained by cross-sectional and fixed effects models for overall Pakistan data, a series of robustness checks is conducted. Table A-3 represents the results for second stage of Linear Probability Model. The effect of almost all socioeconomic determinants of at least three antenatal visits to a health facility, minimum two tetanus inoculations, safe delivery care and postnatal care utilization remain consistent with the cross-sectional results of the IV-Probit model.

To authenticate the findings of the fixed effects models, district fixed effects models are also conducted for all components of maternal health seeking behavior of women. The results of this model, presented in table A-4 are consistent with cluster fixed effects. Especially with

respect to tetanus inoculations, table A-4 exhibits that once district specific characteristics such as distance to facility, are controlled for, the effect of most individual determinants on inoculations become insignificant.

7. Conclusion and Policy Recommendations

This study aims to identify the socioeconomic determinants of maternal health seeking behavior of women in Pakistan, using the instrumental variable approach. In the wake of binary dependant variables, IV-Probit model has been used. The analysis has been performed on a number of individual, household and community specific characteristics of women.

Among individual characteristics, women's educational attainment as well as spouse's education, women's health knowledge and child's birth order are found to be particularly important determinants of maternal health seeking behavior of women. Results of both, the cross-sectional model as well as fixed effects models, confirm the importance of formal schooling received by women in Pakistan. These effects of education are, however, not uniform across different levels of educational attainment of women, the net effect being highest for women with complete secondary or higher education. It is also interesting to note that women with any level of formal schooling, even primary schooling, are more likely to seek maternal health care, reiterating the importance of maternal education. On the other hand, the effect of husband's education at middle or higher level emerges as a significant influence on maternal health care utilization. This implies that schooling of spouses up to primary level only is not sufficient to transform their attitudes towards modern medicine

Another important finding is that women's health knowledge has emerged to be a strong influence on maternal health seeking behavior of women, even after controlling for education. This implies that formal education received by women increases their health knowledge but it is not the only source of health knowledge for them. The results confirm that health knowledge can be acquired at any stage in life. Information regarding safe maternal health care practices

imparted to them via mass communication mediums and their interaction with other women living in the same vicinity plays an important role in this regard. Hence public programs targeted particularly at women of childbearing age could be effective in increasing their health knowledge and improve their maternal health seeking behavior

The results for birth order exhibit that women going through the process of motherhood for the first time are more cautious. On the contrary, women with a higher number of children tend to attach less importance to their health and maternal healthcare services. Therefore as the number of births increase, women are less likely to seek healthcare. This finding is robust to all econometric specifications, including fixed-effects estimates.

The empirical findings show that older women are more likely to seek maternal health care as compared to younger women, aged less than 25 years of age. One of the interesting results of this analysis is that working women are less likely to seek maternal health care as compared to women who are not working. These results point towards the fact that women's empowerment does not necessarily stem from their employment status. Instead, the nature of job plays an important role in determining female empowerment. Therefore, skill oriented training programs targeted for less educated or illiterate women can play an instrumental role in increasing women's productivity and generating better employment opportunities for them.

Moreover, according to our data, working women belong to less affluent households, therefore working might not be a personal decision but a need based requirement. These findings confirm that in a society like Pakistan, with complex family structures, female empowerment could instead be reflected by involvement of women in the decision making process. The results for spousal discussion of place of delivery support this argument.

Education by increasing women's knowledge, capabilities and confidence can also be empowering for them. It increases their self awareness, modifies traditional balance of families and helps women assume greater responsibility regarding their health seeking behavior.

With respect to household characteristics, household's socioeconomic status, represented by wealth index, emerges as one of the most important determinants of maternal health care utilization by women. While this might not be a novel finding, it implies a strong effect of poverty over maternal health seeking behavior of women.

However, tetanus inoculations received by women is not determined by a household's socioeconomic status. While the inoculation in women seems to be independent of most individual and household characteristics, studying what factors go into the uptake of inoculations can be an area of further research. Lady Health Worker program is one of the most extensive health care programs in Pakistan. Most women might receive tetanus shots from the door-to-service of lady health workers which is a part of their stipulated job description. The results point towards the importance of supply side factors. Provided, lady health workers are the most pervasive source of inoculations for rural women, improving their outreach can result in a significant improvement in women's health.

Consanguineous marriages and their impact on women's health seeking behavior is a relatively untapped area of research in Pakistani context. This study's results firmly emphasize that the maternal health seeking behavior of women is governed by socioeconomic determinants irrespective of the fact that a woman is married to her first cousin.

Lastly, behavioral differences in maternal health seeking behavior of women of provinces of Punjab, Sindh and KPK implies that there is a need to improve socioeconomic conditions as

well as availability and quality of services available in these areas as well. The findings of this study indicate that education has several spillover effects and therefore it can play a crucial role in this regard.

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Appendix

Table A-1: First Stage Regression Results of Health Knowledge (Endogenous Covariate)

Explanatory Variables	Coefficients
Instrumental Variable	
Mass Media Exposure	
Heard a family planning message on radio or tv last month	0.0923*** (0.0183)
Individual Characteristics	
Age	
<25 (reference)	
25-34	0.0201 (0.0204)
35-49	-0.0279 (0.0288)
Education	
Illiterate (reference)	
Primary but below middle	-0.0120 (0.0289)
Middle but below secondary	-0.00990 (0.0329)
Secondary and above	0.0327 (0.0289)
Working Woman	0.133*** (0.0213)
Child's birth order	
1 (reference)	
2 to 3	0.0354* (0.0210)
4 to 6	0.0551** (0.0259)
7 +	0.102*** (0.0341)
Previous Fetal Loss or Still Birth	0.111*** (0.0207)
Previous Fetal Loss/Still Birth* Working Woman	-0.0648* (0.0368)
Planned pregnancy	-0.0622*** (0.0183)

Table A-1: First Stage Regression Results of Health Knowledge (Endogenous Covariate)

Explanatory Variables	Coefficients
Husband's education	
Illiterate (reference)	
Primary but below middle	0.00774 (0.0251)
Middle but below secondary	0.0244 (0.0238)
Secondary and above	0.0108 (0.0214)
Husband has Skilled Employment	-0.0374** (0.0165)
Spousal Discussion of Place of Delivery	0.0866*** (0.0164)
Blood Relation with Husband	0.0287* (0.0156)
Wife of Household Head	0.0199 (0.0179)
Household Characteristics	
Household wealth (index)	-0.0193* (0.0108)
Number of household members	0.000750 (0.00164)
Community Characteristics	
Place of residence	
<i>Region</i>	
Urban (reference)	
Rural	-0.0061 (0.0250)
Punjab (reference)	
Sindh	0.270*** (0.0254)
Khyber Pakhtunkhwa	-0.0159 (0.0323)
Constant	0.251*** (0.0427)
Number of Observations	4174
F (25, 949)	18.43
R-squared	0.1323

Notes: * = $p < 0.10$, ** = $p < 0.05$, *** = $p < 0.01$.

Robust standard errors at cluster level are given in the parenthesis below estimates.

Source: Author's calculations

Table A-2: Marginal Effects of Probit Results for Maternal Health Care Utilization Behavior of Women in Pakistan

Explanatory Variables	ANTENATAL CARE		SAFE DELIVERY	POSTNATAL CARE
	Minimum 3 Antenatal Visits to a Health Facility	At least two Tetanus Toxoid Injections	Gave birth at a health facility/by trained health service providers	Received trained postnatal care
Individual Characteristics				
Age				
<25 (reference)				
25-34	0.0341 (0.02242)	-0.0143 (0.0230)	0.0308 (0.0220)	0.0221 (0.0173)
35-49	0.1287*** (0.03427)	0.0867*** (0.0324)	0.1384*** (0.0322)	0.0645*** (0.0269)
Education				
Illiterate (reference)				
Primary but below middle	0.1451 (0.03102)	0.1820*** (0.0284)	0.1254*** (0.0305)	0.0697*** (0.0263)
Middle but below secondary	0.1957*** (0.03435)	0.2139*** (0.0311)	0.1752*** (0.0344)	0.1046*** (0.0294)
Secondary and above	0.2056*** (0.03478)	0.1712*** (0.0325)	0.0266*** (0.0334)	0.1322*** (0.0295)
Health Knowledge	1.5039*** (0.19925)	1.7359*** (0.2146)	-0.1383*** (0.0330)	0.5510*** (0.1608)
Working Woman	-0.2183*** (0.0302)	-0.2595*** (0.0347)	-0.2595*** (0.0347)	-0.0985*** (0.0244)

Table A-2: Marginal Effects of Probit Results for Maternal Health Care Utilization Behavior of Women in Pakistan

Explanatory Variables	ANTENATAL CARE		SAFE DELIVERY	POSTNATAL CARE
	Minimum 3 Antenatal Visits to a Health Facility	At least two Tetanus Toxoid Injections	Gave birth at a health facility/by trained health service providers	Received trained postnatal care
Child's birth order				
1 (reference)				
2 to 3	-0.1581*** (0.2486)	-0.1001*** (0.0246)	-0.1024*** (0.0240)	-0.0627*** (0.0183)
4 to 6	-0.2053*** (0.02855)	-0.1608*** (0.0314)	-0.1799*** (0.0280)	-0.0966*** (0.0208)
7 +	-0.2860*** (0.02931)	-0.2710*** (0.0369)	-0.1972*** (0.0350)	-0.1293*** (0.0238)
Previous Fetal Loss or Still Birth	-0.1371*** (0.0329)	0.1750*** (0.0330)	-0.0512 (0.0321)	-0.0450* (0.0236)
Previous Fetal Loss/Still Birth* Working Woman	0.1502*** (0.0455)	0.0815* (0.0460)	0.0898** (0.0458)	0.0353 (0.0389)
Planned pregnancy	0.0273 (0.0247)	0.1262*** (0.0251)	0.0466* (0.0244)	0.0569*** (0.0182)

Table A-2: Marginal Effects of Probit Results for Maternal Health Care Utilization Behavior of Women in Pakistan

Explanatory Variables	ANTENATAL CARE		SAFE DELIVERY	POSTNATAL CARE
	Minimum 3 Antenatal Visits to a Health Facility	At least two Tetanus Toxoid Injections	Gave birth at a health facility/by trained health service providers	Received trained postnatal care
Husband's education				
Illiterate (reference)				
Primary but below middle	-0.0182** (0.0286)	-0.0048** (0.0293)	0.0453 (0.0292)	0.0171 (0.0235)
Middle but below secondary	0.0574** (0.0270)	0.0554** (0.0235)	0.0466* (0.0258)	0.0274 (0.0222)
Secondary and above	0.0951*** (0.0235)	0.0793*** (0.0199)	0.0957*** (0.0229)	0.0806*** (0.0184)
Husband has Skilled Employment	0.0848*** (0.0187)	0.0504** (0.0199)	0.0063 (0.0193)	0.0272* (0.0155)
Spousal Discussion of Place of Delivery	0.0593** (0.0258)	-0.0263 (0.0279)	0.1286*** (0.0263)	0.0998*** (0.0214)
Blood Relation with Husband	-0.0672*** (0.0180)	0.0263 (0.0183)	-0.0193 (0.0178)	-0.0014 (0.0144)
Wife of Household Head	-0.0441*** (0.0208)	-0.0727*** (0.02)	-0.0549*** (0.0207)	-0.0441*** (0.0169)

Table A-2: Marginal Effects of Probit Results for Maternal Health Care Utilization Behavior of Women in Pakistan

Explanatory Variables	ANTENATAL CARE		SAFE DELIVERY	POSTNATAL CARE
	Minimum 3 Antenatal Visits to a Health Facility	At least two Tetanus Toxoid Injections	Gave birth at a health facility/by trained health service providers	Received trained postnatal care
Household Characteristics				
Household wealth (index)	0.0525 (0.0117)	0.0184 (0.0127)	0.0668*** (0.0118)	0.0389*** (0.0091)
Number of household members	-0.0036 (0.0020)	-0.0028 (0.0020)	-0.0036* (0.0020)	-0.0019 (0.0014)
Community Characteristics				
Place of residence				
<i>Region</i>				
Urban (reference)				
Rural	-0.0933*** (0.0217)	0.0370*** (0.0229)	-0.1183 (0.0234) ***	-0.0769*** (0.182)
<i>Province</i>				
Punjab (reference)				
Sindh	-0.2626*** (0.0458)	-0.4547 (0.0462)	-0.0261 (0.0594)	-0.0298 (0.0439)
Khyber Pakhtunkhwa	-0.0193 (0.0249)	-0.0107** (0.0297)	0.0655** (0.0305)	-0.0276 (0.0216)

Robust standard errors at cluster level are given in the parenthesis below estimates.

Source: Author's calculations

Table A-3: Linear Probability Model Results for Maternal Health Care Utilization Behavior of Women in Pakistan

Explanatory Variables	ANTENATAL CARE		SAFE DELIVERY	POSTNATAL CARE
	Minimum 3 Antenatal Visits to a Health Facility	At least two Tetanus Toxoid Injections	Gave birth at a health facility/by trained health service providers	Received trained postnatal care
Individual Characteristics				
Age				
<25 (reference)				
25-34	0.0255 (0.0186)	-0.0148 (0.0203)	0.0264 (0.0186)	0.0238 (0.0167)
35-49	0.104*** (0.0266)	0.0783*** (0.0292)	0.114*** (0.0252)	0.0599*** (0.0213)
Education				
Illiterate (reference)				
Primary but below middle	0.134*** (0.0276)	0.177*** (0.0279)	0.114*** (0.0272)	0.0656*** (0.0243)
Middle but below secondary	0.184*** (0.0304)	0.201*** (0.0293)	0.165*** (0.0310)	0.109*** (0.0289)
Secondary and above	0.191*** (0.0292)	0.149*** (0.0289)	0.241*** (0.0279)	0.172*** (0.0284)
Health Knowledge	1.300*** (0.181)	1.577*** (0.196)	0.554*** (0.182)	0.527*** (0.164)
Working Woman	-0.198*** (0.0303)	-0.242*** (0.0340)	-0.121*** (0.0302)	-0.101*** (0.0274)

Table A-3: Linear Probability Model Results for Maternal Health Care Utilization Behavior of Women in Pakistan

Explanatory Variables	ANTENATAL CARE		SAFE DELIVERY	POSTNATAL CARE
	Minimum 3 Antenatal Visits to a Health Facility	At least two Tetanus Toxoid Injections	Gave birth at a health facility/by trained health service providers	Received trained postnatal care
Child's birth order				
1 (reference)				
2 to 3	-0.138*** (0.0223)	-0.0886*** (0.0216)	-0.0919*** (0.0217)	-0.0684*** (0.0201)
4 to 6	-0.181*** (0.0270)	-0.144*** (0.0284)	-0.161*** (0.0267)	-0.102*** (0.0236)
7 +	-0.281*** (0.0363)	-0.256*** (0.0376)	-0.187*** (0.0371)	-0.137*** (0.0311)
Previous Fetal Loss or Still Birth	-0.116*** (0.0299)	-0.159*** (0.0293)	-0.0423 (0.0284)	-0.0378 (0.0251)
Previous Fetal Loss/Still Birth* Working Woman	0.116*** (0.0369)	0.0741* (0.0414)	0.0654* (0.0361)	0.0232 (0.0318)
Planned pregnancy	0.0287 (0.0214)	0.114*** (0.0227)	0.0419** (0.0210)	0.0584*** (0.0187)

Table A-3: Linear Probability Model Results for Maternal Health Care Utilization Behavior of Women in Pakistan

Explanatory Variables	ANTENATAL CARE		SAFE DELIVERY	POSTNATAL CARE
	Minimum 3 Antenatal Visits to a Health Facility	At least two Tetanus Toxoid Injections	Gave birth at a health facility/by trained health service providers	Received trained postnatal care
Husband's education				
Illiterate (reference)				
Primary but below middle	-0.0191 (0.0235)	-0.00103 (0.0268)	0.0353 (0.0240)	0.00808 (0.0198)
Middle but below secondary	0.0442** (0.0225)	0.0538** (0.0244)	0.0367* (0.0216)	0.0156 (0.0189)
Secondary and above	0.0782*** (0.0201)	0.0751*** (0.0217)	0.0829*** (0.0196)	0.0759*** (0.0166)
Husband has Skilled Employment				
	0.0746*** (0.0159)	0.0461** (0.0179)	0.00351 (0.0163)	0.0224 (0.0145)
Spousal Discussion of Place of Delivery				
	0.0558** (0.0240)	-0.0254 (0.0262)	0.116*** (0.0237)	0.0959*** (0.0212)
Blood Relation with Husband				
	-0.0543*** (0.0147)	-0.0235 (0.0163)	-0.0148 (0.0147)	-0.00176 (0.0131)
Wife of Household Head				
	-0.0366** (0.0170)	-0.0659*** (0.0178)	-0.0461*** (0.0171)	-0.0396** (0.0154)

Table A-3: Linear Probability Model Results for Maternal Health Care Utilization Behavior of Women in Pakistan

Explanatory Variables	ANTENATAL CARE		SAFE DELIVERY	POSTNATAL CARE
	Minimum 3 Antenatal Visits to a Health Facility	At least two Tetanus Toxoid Injections	Gave birth at a health facility/by trained health service providers	Received trained postnatal care
Household Characteristics				
Household wealth (index)	0.0439*** (0.00937)	0.0169 (0.0113)	0.0561*** (0.00963)	0.0373*** (0.00817)
Number of household members	-0.00267* (0.00159)	-0.00251 (0.00180)	-0.00286* (0.00171)	-0.00191 (0.00133)
Community Characteristics				
Place of residence				
<i>Region</i>				
Urban (reference)				
Rural	-0.0812*** (0.0190)	-0.0342* (0.0205)	-0.105*** (0.0206)	-0.0794*** (0.0178)
<i>Province</i>				
Punjab (reference)				
Sindh	-0.254*** (0.0508)	-0.450*** (0.0554)	-0.0306 (0.0525)	-0.0290 (0.0470)
Khyber Pakhtunkhwa	-0.0165 (0.0200)	-0.00787 (0.0265)	0.0485* (0.0250)	-0.0307 (0.0192)
Constant	-0.00651	0.00397	0.181***	0.0206
Number of Observations	4133	4125	4172	4186
Adjusted R-squared	0.237	0.143	0.224	0.193

Notes: * = $p < 0.10$, ** = $p < 0.05$, *** = $p < 0.01$.

Robust standard errors at cluster level are given in the parenthesis below estimates.

Source: Author's calculations

Table A-4: District Fixed Effects for Maternal Health Care Utilization Behavior of Women in Pakistan

Explanatory Variables	ANTENATAL CARE		SAFE DELIVERY	POSTNATAL CARE
	Minimum 3 Antenatal Visits to a Health Facility	At least two Tetanus Toxoid Injections	Gave birth at a health facility/by trained health service providers	Received trained postnatal care
Individual Characteristics				
Age				
<25 (reference)				
25-34	-0.00875 (0.0267)	-0.0492 (0.0315)	0.00683 (0.0215)	0.00818 (0.0200)
35-49	0.0195 (0.0354)	-0.0241 (0.0419)	0.0694** (0.0285)	0.0258 (0.0266)
Education				
Illiterate (reference)				
Primary but below middle	0.0873*** (0.0329)	0.102*** (0.0394)	0.0860*** (0.0265)	0.0469* (0.0248)
Middle but below secondary	0.138*** (0.0375)	0.131*** (0.0447)	0.149*** (0.0302)	0.0958*** (0.0283)
Secondary and above	0.177*** (0.0339)	0.118*** (0.0404)	0.238*** (0.0272)	0.175*** (0.0254)
Health Knowledge	0.945*** (0.232)	1.214*** (0.274)	0.378** (0.187)	0.471*** (0.172)
Working Woman	-0.0583** (0.0264)	-0.0652** (0.0313)	-0.0586*** (0.0210)	-0.0556*** (0.0196)

Table A-4: District Fixed Effects for Maternal Health Care Utilization Behavior of Women in Pakistan

Explanatory Variables	ANTENATAL CARE		SAFE DELIVERY	POSTNATAL CARE
	Minimum 3 Antenatal Visits to a Health Facility	At least two Tetanus Toxoid Injections	Gave birth at a health facility/by trained health service providers	Received trained postnatal care
Child's birth order				
1 (reference)				
2 to 3	-0.109*** (0.0268)	-0.0769** (0.0320)	-0.0794*** (0.0216)	-0.0591*** (0.0202)
4 to 6	-0.160*** (0.0337)	-0.147*** (0.0404)	-0.151*** (0.0272)	-0.0989*** (0.0254)
7 +	-0.211*** (0.0434)	-0.195*** (0.0518)	-0.151*** (0.0351)	-0.119*** (0.0327)
Previous Fetal Loss or Still Birth	-0.0201 (0.0275)	-0.0514 (0.0327)	0.000970 (0.0223)	-0.00326 (0.0208)
Previous Fetal Loss/Still Birth* Working Woman	0.0495 (0.0447)	0.00835 (0.0536)	0.0313 (0.0360)	-0.0117 (0.0336)
Planned pregnancy	-0.00566 (0.0221)	0.0707*** (0.0266)	0.0340* (0.0179)	0.0483*** (0.0166)

Table A-4: District Fixed Effects for Maternal Health Care Utilization Behavior of Women in Pakistan

Explanatory Variables	ANTENATAL CARE		SAFE DELIVERY	POSTNATAL CARE
	Minimum 3 Antenatal Visits to a Health Facility	At least two Tetanus Toxoid Injections	Gave birth at a health facility/by trained health service providers	Received trained postnatal care
Husband's education				
Illiterate (reference)				
Primary but below middle	-0.0285 (0.0306)	-0.00886 (0.0361)	0.0334 (0.0244)	0.00246 (0.0229)
Middle but below secondary	0.0235 (0.0294)	0.0273 (0.0352)	0.0248 (0.0238)	0.00123 (0.0222)
Secondary and above	0.0771*** (0.0259)	0.0648** (0.0306)	0.0883*** (0.0209)	0.0752*** (0.0196)
Husband has Skilled Employment	0.0546*** (0.0196)	0.0305 (0.0234)	-0.00519 (0.0158)	0.0175 (0.0147)
Spousal Discussion of Place of Delivery	0.0802*** (0.0273)	-0.000817 (0.0325)	0.122*** (0.0217)	0.0940*** (0.0201)
Blood Relation with Husband	-0.0129 (0.0179)	0.0136 (0.0213)	0.00406 (0.0144)	0.0128 (0.0134)
Wife of Household Head	-0.00549 (0.0216)	-0.0128 (0.0256)	-0.0267 (0.0173)	-0.0265 (0.0162)

Table A-4: District Fixed Effects for Maternal Health Care Utilization Behavior of Women in Pakistan

Explanatory Variables	ANTENATAL CARE		SAFE DELIVERY	POSTNATAL CARE
	Minimum 3 Antenatal Visits to a Health Facility	At least two Tetanus Toxoid Injections	Gave birth at a health facility/by trained health service providers	Received trained postnatal care
Household Characteristics				
Household wealth (index)	0.0306** (0.0120)	0.0139 (0.0143)	0.0477*** (0.00968)	0.0336*** (0.00897)
Number of household members	-0.00155 (0.00197)	0.00109 (0.00230)	-0.00267* (0.00155)	-0.00179 (0.00145)
Number of Observations	4121	4113	4160	4174
Adjusted R-squared	-0.502	-0.988	0.026	-0.072

Notes: * = $p < 0.10$, ** = $p < 0.05$, *** = $p < 0.01$.

Robust standard errors at cluster level are given in the parenthesis below estimates.

Source: Author's calculations