Socioeconomic Determinants of Prenatal-care Utilization in Pakistan

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Abstract

Prenatal care is one of the important health care factor and complex phenomena. It is linked with the target to reduce maternal and infant mortality and morbidity. In this paper, an attempt is made to examine the factors associated with the use of prenatal care services in Pakistan among the reproductive age group of women i-e 15-49 years on the basis of micro data from a survey conducted by the Federal Bureau of Statistics. The total number of observations included in the analysis is 13594 from Pakistan Integrated Household Survey. Logistic regression analysis and linear regression analysis are used to determine the association between prenatal care and other explanatory factors. A series of model have been used in which the dependent variables measuring the prenatal care utilization are: either the women receives the prenatal care or not; what is the month of first consultation that is most appropriate during the first three months of pregnancy; either the women receives the prenatal care from the expert or non expert and index of Tetnas Toxiod vaccination during current pregnancy and previous pregnancy. In the first three models we have used binary logistic regression to see the determinants of the decision of the women to take prenatal care in Pakistan. In the fourth model, we have used OLS to see the effects of the factors affecting the prenatal care services. For the explanatory variables, we have characterized the individual characteristics of the women, household characteristics, socio economic factors of the household and community characteristics. Our results have shown that income affects prenatal-care utilization positively. Female education retains a net effect on prenatal care services independent of women's other characteristics and affects prenatal-care

utilization positively. Age of women also positively affects the prenatal care services. Good health proxy measures like sewerage, source of drinking water etc affect positively prenatal care services.

Key words: Women health, prenatal-care, Pakistan, Tetnas Toxiod Vaccination

1. Introduction

Prenatal care is an important indicator of maternal health care services. It refers to the health services that a pregnant woman receives before baby's birth. Health care providers know that prenatal care services are important for mothers and her babies to avoid from many complications.

Prenatal care is important for health of mother and child. It refers to pregnancy related health care check ups provided at medical facility or at home. Ideally, prenatal care provided comprises at least three visits while lack of prenatal care associated with many complications like premature delivery, infant and maternal mortality, and lack of information. (Titelay 2010, Heaman 2008, Bassani 2009)

Prenatal care is an important determinant of infant and maternal mortality which aims to prevent infants and maternal deaths and maintain health of women during pregnancy as these factors affect women health to a great extent. More than half of women die annually worldwide due to pregnancy related complications. About 90-95% of these come from developing countries. The World Health Organization recommends that a woman without complications have at least four visits to get sufficient prenatal care. According to international standard, initiation of care should start in first trimester of pregnancy in order to avoid many pregnancy complications. (Beeckman 2010) Prenatal care is more likely to be effective if women begin to receive care in the first trimester of pregnancy and continue to receive care throughout pregnancy (Heaman 2008)

Against this background, we focus on Pakistan a low income transitional country. There are several reasons why the determinants of prenatal care in this country should be in focus of urgent research efforts. First, Pakistan has worst indicators of maternity care e.g high infant mortality rate, maternal mortality rate, morbidity and neonatal rate in the entire country as compared to developed and developing countries as well. As infant mortality rate in Pakistan is 63.26 deaths per thousand and total fertility rate is 3.17 children.

Second, life expectancy is important and good indicator of health and Pakistan has done better in life expectancy. The average life expectancy is 67.2 years estimated in 2010, well comparable

with Bangladesh and India but mortality rate for children under five and infant mortality rate is still high due to birth related problems[1].

Third, previous studies on prenatal care services in Pakistan are based on cross sectional data or pooled data. In comparison, this study uses the most recent available data i.e microdata, the high quality Pakistan Integrated Household Survey 2001. Using newly available data permit us to receive up to date results reflecting current reality of country.

Finally, commitment to improve accessibility, affordability and quality is one of key measure of health care sector reforms. Regarding this study, quality of prenatal care can be assessed by the type of provider, number of prenatal visit, time of first visit. 61% of mothers receive prenatal care from skilled health provider i.e from a doctor, nurse, midwife of lady health visitor. 3% receive prenatal care from traditional birth attendant. 1% prenatal care from lady health workers while 35% receive no prenatal at all[2]. The main objective of this study is to analyze the determinants of prenatal care services in Pakistan regarding consultation, first consulting month, care received either from government or private sector and tetanus toxiod vaccination received.

2. Review of Literature

A number of previous studies describe the different measures of prenatal care services; multiple socio economic, demographic and environmental factors which are most closely associated with the utilization of prenatal care services and also focus on the factors affecting the adequate utilization of prenatal care services.

Most of studies identify factors affecting the utilization of prenatal care and inadequate use of prenatal care services among married women of reproductive age i.e 15-49. (White et al 2003) assess the utilization pattern of antenatal care at Rehri Goth, an urban squatter settlement of Karachi which is remote area of Karachi and number of maternal deaths and serious morbidity has been reported in this area. Cross section data was collected through structured questionnaires on socio economic conditions, demographic information's and knowledge of female about antenatal care. Chi square test was used for bivariate analysis for the categorical variables. Multivariate logistic regression was used to evaluate the combined effect of multiple factors affecting the utilization of antenatal care. Income, knowledge about pregnancy related and education is significantly associated with utilization of maternal health services. Poverty negatively affects the utilization services. Knowledge about quantity and type of food include in pregnant women's diet was found significantly associated with antenatal care utilization. Reporting of danger signs like persistent vomiting, fever and sever abdominal pain was found to be significantly associated with utilization of antenatal care. Half of women neither received tetanus immunization nor receive iron supplement. (Titley 2010) examines the factors associated with the underutilization of antenatal care services in Indonesia by using data from Indonesia

[1] Pakistan Economic Survey 2010-11

[2] Pakistan Demographic and Health Survey 2006-07, National Institute of Population Studies, Islamabad, Pakistan

Demographic and Health Survey through collecting information on ever married men and women 15-54 and 15-49 respectively about demographic and health status. Logistic regression was used to determine the factors associated with outcome, Bivariate and multivariate analysis was conducted to assess crude odd ratio respectively. Antenatal services referred to any pregnancy related services provided by skilled health professional. Wealth index[3], (Hibobv 2011) education level and birth rank with birth interval are significant factors associated with underutilization of prenatal care services. Others factors included less exposure to mass media, woman lacking knowledge about obstetric complications are also significantly associated with underutilization of antenatal care services.

Adequacy of prenatal care is comprised of two parts initiative month of prenatal care and total number of visits from initiation to delivery. Inadequate utilization refers to prenatal are started after fourth month of pregnancy and less than fifty percent expected visits. (Heaman etal 2008) determines the rate of prenatal care utilization in Winnipeg Manitoba from 1991 to 2000 and compare two commonly used indices. The writer analyzes the association between inadequate prenatal care and preterm birth, low birth weight and small for gestational age.[4] (Bassanai 2009) also analyze the association of inadequate prenatal care and birth outcome after controlling for maternal age and parity and also including both attitudes related to pregnancy planned pregnancy and satisfied with pregnancy. (Beeckman 2010) study in spite of pregnancy related factors also aims to study predisposing and enabling factors (Beeckman 2011) on initiation of prenatal care in Bruessela of Metropolitan Region as initiation of prenatal care at early stage of pregnancy is much important to avoid from pregnancy related complications.[5] Insurance coverage or having regular use of care has accessibility to health care. Late initiation was defined after twelve weeks of gestation and it is studied with predisposing variables like mother's age, marital status, educational level, and origin, occupational status while equivalent income, health insurance coverage receiving welfare benefits belonging from enabling factors. The influence of predisposing factors on the number of prenatal visits in socio economically disadvantaged women. Higher education and higher income shows higher effect on antenatal visits. Insured women are more likely to have three antenatal visits. This is due to the difference in health insurance in Asia as compared to with Europe.

[3] Titley 2010 Wealth index was constructed to rank household across pooled IDHS data. Weights are assigned to four housing characteristics (source of drinking water, type of toilet, main material of floor and material of wall) and seven household assets (availability of electricity, possession of radio, television, fridge, bicycle, motorcycle and car). A composite variable is divided into three categories i.e rich, middle and poor. While Hibobv 2011 measures wealth index as such manner but household are rank according to total scores of household into five categories i.e poorest, poor, middle, richer and richest. In spite of this Hibobv used wealth index as proxy of income and consumption.

[4] Former explains that women who do not receive adequate prenatal care are less likely to receive appropriate treatment or preventive care.

[5] Beeckman 2010, 2011 differ in context that former has the number of antenatal visit determinants while later has also included the determinants of initiation of prenatal after twelve weeks of gestation. Bivariate analysis conducted for both studies while passion regression model for former and odd ratios and confidence interval used in latter for multivariate analysis.

Utilization of prenatal care is much more in urban areas than that of rural areas. (Alexandre 2005) examine the determinants of using prenatal care in rural areas and in urban areas of Haitai and also those females who had at least one prenatal care visit as there are wide disparities between rural and urban areas. Multivariate logistic analysis of probability of seeking prenatal care of women living in rural Haitai was used. Women with primary level of education in rural and urban areas of Haitaai more likely better than women who had no education and women who had secondary education better than primary education women. Mothers whose partner have secondary level education are more likely better than mothers whose partner has no education in rural as well as in urban areas. Many other factors like mother body mass index is positively related while Protestantism is significantly and negatively related to prenatal care visits of women.

(Mikhail 2000) assess prenatal care utilization among low income African American women through examining the relations of demographic and other selected variables to adequacy of prenatal care utilization and describes women positive and negative experiences with prenatal care. A Chi Square test was conducted to determine the association between adequate prenatal care utilization and demographic and other variables. The belief in the importance of prenatal care was significantly associated with adequate prenatal care utilization while none of other variables are significant. Women experience difficulties in keeping appointments, lack of transportation and long waiting time at clinics. (Gazmararian 2009, Zaid etal 1996, Nisar 2007)[6] most influential barriers are negative attitudes towards the adequacy of prenatal care utilization and were calculated by using Koteluck's index.

Different socio economic, demographic and environmental factors affect the utilization of antenatal care due to variety of reasons in developing countries. Socio economic variables such as household assets, owning a modern transport, husband education and occupation and other community variables like presence of electricity and quality of home increase the probability of utilizing antenatal care services. Most of the stress is given towards the rural urban settings regional place of living which is most important determinant of antenatal care utilization (Alam 2004, Fatmi 2002, Hibobv 2011, Nisar 2007)[7].

[6] Gazmararian 2009, determines barriers to prenatal care services among managed care enrollees who receive Medicaid. Women have positive attitude towards prenatal care and it was not related to initiation or adequacy of prenatal care. Additional barriers reported are sadness and depression.
Zaid etal 1996, identify the characteristics of Hispanic women and factors unique to US Mexico border community focused on those women who delivered at university teaching hospital.
Nisar 2007, additional reasons incorporated are inadequate supply of medicine and incomplete tetanus vaccination.

[7] Alam 2004, Fatmi 2002, used cross sectional data for analysis by using multivariate logistic regression while Hibobv 2011, Nisar 2007

3. Data Set and Methodology

3.1 Data Set

Data set used in this study comes from Pakistan Integrated Household Survey (PIHS) conducted by Federal Bureau of Statistics, Pakistan, and the national statistical authority in 2001. The PIHS is a part of long standing worldwide demographic, socio economic and health survey program which is developed to assist developing countries in collecting data on family planning, reproductive health, maternal and child health, nutrition, immunization, education and employment.

The PIHS is nationally representative survey of more than30000 observations including female aged 15-49 and children above 10 years and old. The PIHS employs a multistage statistical clustered sampling design based on a sampling frame that is from the population census of Pakistan republic conducted in 1998. In this sampling frame, stratification was achieved in two stages. In the first stage, the country was stratified by economic regions and in the second stage regions were divided into rural and urban strata.

The PIHS collect a wide range of detailed information on maternal, child health, family planning, prenatal, delivery and postnatal health care utilization and contains comprehensive information on prenatal care utilization. The questions about prenatal health care utilization concern only the most recent births delivered during this period. In addition, asking women whether anyone who receives prenatal care for pregnancy during last birth, the PIHS records information about the frequency and utilization as well as about the quality of utilized services.

3.2 Measuring Prenatal Health Care Utilization (Dependent Variable)

The aim of this paper has motivated us to examine the socio economic determinant of prenatal health care utilization in Pakistan. To shed light on prenatal health care utilization in the country, the following four research questions are investigated in this study.

1. What are determinants of prenatal health care utilization regarding consultation of prenatal services?
2. What are the determinants of first consulting month of utilization of health care?
3. What are the determinants of quality of care received or utilized care?
4. What are the determinants of total vaccination care received?

As this study seeks to find the answer of these four specific research questions we have studied four distinctive studied dependent variables as indicator of prenatal care utilization.

To answer the first question, we examined the answer we examined the answer to the question followed by PIHS; did you have any prenatal consultation during previous pregnancy? The respondent has response either yes or no. this question clearly identifies hose women who did not

receive any prenatal health care during their last pregnancy. For the women who did receive care, PIHS asked the following questions like where did you receive prenatal care? The response to this question represent the quality of care received either the female received care from government hospital or from private hospital of lady health visitor etc. As in government sector qualified doctors come after competition. While we have categorized this question's answer in two categories either they receive care from government hospital coded as 1 or from private sector coded as 0.

Another follow up question by PIHS was at what month of pregnancy did you go for consultation? The response to this question was in exact month of pregnancy during which female go towards specialist for first check up. It is common to measure the timings of pregnancy by trimester and normally it is divided in three trimesters and it was better think that first visit towards specialist during first trimester is best for women health. So, we have been categorized this indicator of prenatal care services as if women receive care during first three months then coded as 1 otherwise 0.

Another follow up question was aimed at assessing the quality of delivered prenatal health care, PIHS asked the question whether during current pregnancy were you given tetanus toxiod vaccination and also during previous pregnancy. The response for each question was coded as 1 if they receive tetanus toxiod vaccination and 0 if they not received. These responses were employed to compute the additive index for vaccination received during current and previous pregnancy. The value of index varies from 0-2. If women received no TT vaccination then the index took the 0 and if women receive vaccination during only current or previous pregnancy then index take value 1 while index took the value 2 if women received vaccination during current as well as previous pregnancy.

3.3 Selection of Explanatory Variables

Michal Grossman (1972) first introduced the notion that demands for medical care is derived from the demand for good health. The rapid increase on determinants of prenatal health care utilization in developing and transitional countries prompts us to base the conceptual frame work of this paper on the most recent systematic lecture review on the topic. The review was conducted by (Hibobv 2011). The major determinants of prenatal health care utilization in developing countries are: women socio demographic characteristics (e.g age, educational attainment) current pregnancy characteristics (e.g birth order) and accessibility services (e.g place of residence rural/ urban and region). Several other factors were also found to be important determinants of prenatal care utilization.

As suggested by the conceptual framework, education is expected to positively relate with prenatal care utilization. Women with higher education are almost twice likely to receive prenatal care from skilled health provider. Women with higher level of educational attainment may have more information regarding health and health care and so can better access to it.

Women's educational attainment is denoted by continuous variable indicating completed year of schooling.

Age of respondent is expected to be positively related with prenatal care service utilization as older women who have experienced earl pregnancies in their life, have lower likelihood of prenatal care utilization due to experience and confidence gained from previous pregnancies. Women's age and age square is also worked as continuous variable. Age square is negatively associated with the prenatal care utilization as age of female increases the prenatal care utilization increases, then stay constant and then with the increase in age prenatal care utilization decreases.

Birth order is expected to be negatively associated with the prenatal care utilization as higher the birth order of female have lower likelihood of prenatal care utilization. It is also denoted by the continuous variable. The total number of children also works in the same manner as birth order. The literature indicates that total number of children and number of died children is expected to be negatively affect the prenatal care utilization. As the number of children increases the prenatal care utilization reduces.

Community variables like electricity, gas, type of toilet, sewerage and source of drinking water are positively associated with the prenatal care utilization. As electricity, gas and type of toilet and number of rooms use as a proxy indicator of social status and health care while sewerage and source of drinking water are direct measures of health care services. As more the number of rooms in the household it is symbol of good health status and better economic position so the utilization of health care is also high.

Two variables were employed to capture the accessibility perspective. First, we use a categorical variable urban and rural that denotes that women living in urban area are more likely use prenatal care services than women live in rural areas. We hypothesize that women living in urban area will have a positive effect on likelihood of prenatal health care utilization as compared with rural areas. Second, we used dummies for seven regions of the country whereas we have used in regression estimate only four major regions of the country, Pakistan. Among the regions Punjab is centrally located region. It is specially dominate in service and agriculture sector. Its share of Pakistan's GDP was 59% in 2010. It has a fertile plain and most of lands are irrigated with canals.

3.4 Model Specification

For each of four research questions, we have to be developed a separate model. In each model, we commence with the examination of descriptive distribution of dependent variable under investigation and discuss the implication of this distribution. Multivariate analysis is followed. The set of independent variables used in all multivariate models are different. All of four multivariate analysis used logit regression model (Nisar and White 2003, Hibobv2010). As either

women receive prenatal consultation or not. The nature of the indicators of the prenatal care is categorical so we employed logit regression on each of four variables.

Although at all of the stages the decision of utilization of health care is affected by the set of factors described in the conceptual framework, we hypothesize the effect of these factors can be different at different stage in all of the different models in all of the four models different variables are significant. So, we employed a multi models to predict the prenatal health care utilization. A general form of the model is

PNCU = f (household characteristics, community characteristics, pregnancy characteristics and accessibility)

The specific forms of these models have been used different indicators of prenatal care utilization as dependent variable.

$$PNCON = f(\beta0 + \beta1\ BALO + \beta2\ ELECT + \beta3\ REG + \beta4\ SDW + \beta5\ SEW + \beta6\ TOTCHIL) \ldots\ldots (1)$$

$$FTCONM = f(\beta0 + \beta1\ AGE + \beta2\ AGSQ + \beta3\ REG + \beta4\ BALO + \beta5\ ELECT + \beta6\ EDU) \ldots\ldots\ldots (2)$$

$$WCAREC = f(\beta0 + \beta1\ PUN + \beta2\ ELECT + \beta3\ REG + \beta4\ SDW + \beta5\ SIN + \beta6\ TOTCHIL) \ldots\ldots\ldots (3)$$

$$TVCREC = f(\beta0 + \beta1\ BALO + \beta2\ AGE + \beta3\ REG + \beta4\ BO + \beta5\ KPK + \beta6\ NROM) \ldots\ldots\ldots\ldots (4)$$

3.5 Operational Definitions of Variables

Variables	Definitions of Variables
Dependent Variable	
Model 1	
PNCON(Prenatal Consultation)	If yes=1, Otherwise =0
Model 2	
FTCONM(Month of First Consultation)	If female receiving first consultation during first three moths of pregnancy=1, Otherwise= 0
Model 3	
WCAREC(From where she receive care)	If female receiving care from government hospital=1 ,Otherwise=0
Model 4	
TVCREC(Total vaccination care received during current pregnancy and during previous pregnancy)	If female receiving care during current pregnancy only or just during previous pregnancy=1, Otherwise=0
Independent Variables	
Age(Age of respondent)	Continuous variable
AGESQU(age Square)	Continuous variable to check the quadratic relation

BALO(Baluchistan)	If yes=1, Otherwise=0
DYCHIL(Died Number of children)	Continuous variable
EDU(Education of respondent)	Continuous variable
ELECT(Electricity)	IF yes=1, Otherwise=0
GASS(Gas)	If yes=1, Otherwise=0
MISCAR(Miscarriages)	Continuous variable (Number of months)
KPK(Kyber Pukhtoonkhwa)	If yes=1, Otherwise=0
REGI(region)	If Urban=1, Rural=0
PUN(Punjab)	If yes=1, Otherwise=0
SDWW(Source of drinking water)	If within Household=1, Otherwise outside household=0
SEWR(Sewrage)	If yes=1, Otherwise=0
SIND(Sind)	If yes=1, Otherwise=0
TOTCHIL(Total number of children)	Continuous variable
BO(Birth order)	Continuous variable
NROM(Number of rooms)	Continuous variable
TTOIL(Type of toilet)	If yes=1, Otherwise=0

4. Findings and Discussions

4.1 Results of the Model 1(Prenatal Care Consultation)

The results of answering the question in regard to the consultation of prenatal care shows that a significant number of women about 18% did not receive any prenatal care during their last pregnancy while about 6% of women received some care and some of the females have missing data. This figure is extremely high even in comparison with other countries with a similar level of economic development or similar socio cultural back ground.

The results of logit regression model estimation on the probability of prenatal health care utilization or consultation that total six variables are found to be significant. Baluchistan, electricity, region, source of drinking water, sewerage and total number of children re found to be significant and all of them occurred with their expected direction. With respect to other explanatory variables in the estimated model, most of them have expected direction, although the effect is not significant.

The total sample size compiled for this study is 13594 but there were only 3220 observations included in the analysis by the statistical package.

Table 1 Multivariate analysis of prenatal consultation

Dependent Variable: PNCON
Method: ML - Binary Logit (Quadratic hill climbing)
Date: 11/17/11 Time: 18:57
Sample (adjusted): 2 13587
Included observations: 3220 after adjustments
Convergence achieved after 6 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
AGE	0.054712	0.047189	1.159438	0.2463
AGESQU	-0.000806	0.000673	-1.196318	0.2316
BALO	-0.327694	0.172971	-1.894500	0.0582
DYCHIL	-0.107578	0.097940	-1.098412	0.2720
EDU	0.013430	0.011065	1.213782	0.2248
ELECT	0.416670	0.130293	3.197940	0.0014
GASS	0.127718	0.113730	1.122994	0.2614
MISCAR	-0.020511	0.050294	-0.407822	0.6834
KPK	0.080739	0.129210	0.624865	0.5321
REGI	0.316972	0.110823	2.860175	0.0042
SDWW	0.315208	0.134608	2.341667	0.0192
SEWR	0.183305	0.115768	1.583380	0.1133
SIND	0.185605	0.100942	1.838726	0.0660
TOTCHIL	-0.047583	0.020717	-2.296832	0.0216
C	-2.553078	0.817367	-3.123538	0.0018

McFadden R-squared	0.033192	Mean dependent var	0.259938
S.D. dependent var	0.438668	S.E. of regression	0.431604
Akaike info criterion	1.117263	Sum squared resid	597.0335
Schwarz criterion	1.145573	Log likelihood	-1783.794
Hannan-Quinn criter.	1.127409	Deviance	3567.587
Restr. deviance	3690.068	Restr. log likelihood	-1845.034
LR statistic	122.4809	Avg. log likelihood	-0.553973
Prob(LR statistic)	0.000000		

Obs with Dep=0	2383	Total obs	3220
Obs with Dep=1	837		

*significant at 10% level of significance

4.2 Results of model 2 (Timing of First Utilization/ Month of First Consultation)

The results of answering the question about the month of first prenatal health care utilization show that most women in Pakistan utilize prenatal health care during first three months. However, a considerable share of women utilizes prenatal health care later months.

The results of logit estimation on the likelihood of six variables on women socio economic characteristics and accessibility are found to be significant predictors of the timings of first prenatal visit. The increase in women's educational attainment is positively associated with the likelihood of prenatal visit. Hence, the regional variables are most important in understanding the timings of prenatal care utilization in Pakistan. Other variables in the estimated model that are statistically significant with their expected direction are as follows: age, age square, Baluchistan, education electricity, region are statistically more important determinants of first consulting month of prenatal health care. Number of observations included in the analysis are 3183.

Table 2: Multivariate Analysis of Month of First Consultation

Dependent Variable: FTCONMN
Method: ML - Binary Logit (Quadratic hill climbing)
Date: 11/17/11 Time: 19:06
Sample (adjusted): 17 13566
Included observations: 3183 after adjustments
Convergence achieved after 7 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
AGE	0.213478	0.079869	2.672865	0.0075
AGESQU	-0.003053	0.001136	-2.686916	0.0072
BALO	-0.842639	0.353075	-2.386571	0.0170
BO	-0.021676	0.041151	-0.526754	0.5984
DYCHIL	-0.199286	0.151353	-1.316689	0.1879
EDU	0.039800	0.016875	2.358462	0.0184
ELECT	0.865761	0.255207	3.392391	0.0007
GASS	-0.188718	0.172281	-1.095408	0.2733
KPK	-0.088154	0.272977	-0.322934	0.7467
MISCAR	0.027984	0.075090	0.372673	0.7094
NROM	0.005791	0.042048	0.137716	0.8905
PUN	-0.335310	0.270474	-1.239711	0.2151
REGI	0.486392	0.189144	2.571545	0.0101
SDWW	0.051455	0.211258	0.243566	0.8076
SEWR	0.249172	0.173735	1.434213	0.1515
SIND	-0.420259	0.280738	-1.496984	0.1344
TOTCHIL	-0.051790	0.035223	-1.470352	0.1415
TTOILT	0.183039	0.193187	0.947474	0.3434
C	-6.519910	1.413368	-4.613031	0.0000

McFadden R-squared	0.046264	Mean dependent var	0.089538
S.D. dependent var	0.285564	S.E. of regression	0.282441
Akaike info criterion	0.586981	Sum squared resid	252.4011
Schwarz criterion	0.623187	Log likelihood	-915.1795
Hannan-Quinn criter.	0.599965	Deviance	1830.359
Restr. deviance	1919.145	Restr. log likelihood	-959.5727
LR statistic	88.78639	Avg. log likelihood	-0.287521
Prob(LR statistic)	0.000000		
Obs with Dep=0	2898	Total obs	3183
Obs with Dep=1	285		

*significant at 10% level of significance

4.3 Results of the Model 3 (Quality of Delivered Care/ Where from Care Recieved)

The dependent variable is categorized as women receive prenatal health care from government sector or from private sector. The logit regression model is fitted to estimate the probability of receiving a higher quality of prenatal services. In the reported results, six variables in the model are found to be significant predictors. Electricity, Punjab, region, source of drinking water, Sindh, and total number of children were statistically significant variables and has expected directions. Total number of observation included in the analysis is 3201.

Table 3: Multivariate Analysis of Quality of Care Received

Dependent Variable: WCAREC
Method: ML - Binary Logit (Quadratic hill climbing)
Date: 11/17/11 Time: 19:11
Sample (adjusted): 17 13587
Included observations: 3201 after adjustments
Convergence achieved after 7 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
AGE	0.039425	0.064945	0.607062	0.5438
AGESQU	-0.000365	0.000921	-0.396034	0.6921
BALO	0.350242	0.366640	0.955273	0.3394
BO	0.023867	0.036062	0.661844	0.5081
DYCHIL	0.077873	0.138512	0.562211	0.5740
EDU	0.018201	0.014836	1.226807	0.2199
ELECT	0.640202	0.215181	2.975174	0.0029
GASS	0.230581	0.153438	1.502761	0.1329
MISCAR	0.002013	0.067350	0.029894	0.9762

KPK	0.236240	0.344356	0.686034	0.4927
PUN	0.616271	0.322072	1.913458	0.0557
REGI	0.528304	0.161921	3.262726	0.0011
SDWW	0.516116	0.227293	2.270710	0.0232
SEWR	0.116645	0.148854	0.783620	0.4333
SIND	0.937232	0.322411	2.906945	0.0036
TOTCHIL	-0.066755	0.030509	-2.188035	0.0287
C	-5.026921	1.179188	-4.263036	0.0000

McFadden R-squared	0.066599	Mean dependent var	0.120275
S.D. dependent var	0.325334	S.E. of regression	0.318015
Akaike info criterion	0.696620	Sum squared resid	322.0086
Schwarz criterion	0.728863	Log likelihood	-1097.941
Hannan-Quinn criter.	0.708180	Deviance	2195.881
Restr. deviance	2352.558	Restr. log likelihood	-1176.279
LR statistic	156.6772	Avg. log likelihood	-0.342999
Prob(LR statistic)	0.000000		

Obs with Dep=0	2816	Total obs	3201
Obs with Dep=1	385		

*significant at 10% level of significance

4.4 Results of the Model 4 (Vaccination Care Received)

The results of the total vaccination care received of either the female's received vaccination during current pregnancy as well as previous pregnancy as indicator of parental health care utilization. The results of logit regression on the likelihood of vaccination care received are found to be six variables related to region and socio economic status is significant predictors. Age, Balochistan, birth order, Kyber Pakhtoonkhwa, region and number of rooms are statistically significant variables of tetanus toxiod vaccination received.

Table 4: Multivariate Analysis of Tetanus Toxiod Vaccination Received

Dependent Variable: TVCREC
Method: ML - Binary Logit (Quadratic hill climbing)
Date: 11/17/11 Time: 19:14
Sample (adjusted): 2 13587
Included observations: 2653 after adjustments
Convergence achieved after 6 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
AGE	-0.139890	0.065738	-2.128003	0.0333

AGESQU	0.000593	0.000990	0.598991	0.5492
BALO	-0.594421	0.329758	-1.802597	0.0715
BO	-0.099784	0.045759	-2.180646	0.0292
DYCHIL	0.066011	0.153915	0.428879	0.6680
EDU	0.018011	0.016404	1.097942	0.2722
ELECT	0.135294	0.171106	0.790701	0.4291
GASS	-0.134125	0.175085	-0.766052	0.4436
KPK	0.615575	0.273365	2.251839	0.0243
MISCAR	0.078373	0.072108	1.086877	0.2771
PUN	-0.077165	0.273437	-0.282205	0.7778
REGI	0.357169	0.160618	2.223718	0.0262
NROM	0.068483	0.037151	1.843376	0.0653
SDWW	0.203333	0.187776	1.082847	0.2789
SEWR	0.064606	0.179780	0.359363	0.7193
SIND	0.157798	0.277603	0.568432	0.5697
TOTCHIL	-0.056263	0.036059	-1.560300	0.1187
C	1.667522	1.111892	1.499715	0.1337

McFadden R-squared	0.138492	Mean dependent var	0.139088
S.D. dependent var	0.346103	S.E. of regression	0.322334
Akaike info criterion	0.708469	Sum squared resid	273.7745
Schwarz criterion	0.748387	Log likelihood	-921.7838
Hannan-Quinn criter.	0.722917	Deviance	1843.568
Restr. deviance	2139.932	Restr. log likelihood	-1069.966
LR statistic	296.3644	Avg. log likelihood	-0.347450
Prob(LR statistic)	0.000000		

Obs with Dep=0	2284	Total obs	2653
Obs with Dep=1	369		

*significant at 10% level of significance

4.5 Discussion

Despite some progress made by Pakistan in regard to improving maternal and child care during past few years, including the decrease in child mortality rate, infant mortality rate and maternal mortality rate, the situation with providing prenatal health care is still far from satisfactory position. As presented in descriptive analysis in terms of prenatal care utilization, its consultation, month of first consultation, where care received and tetanus toxiod vaccination received. Pakistan lags behind other countries with the same level of socio economic development as well as national and international standard.

Against this background, the findings of this study help to identify a number of specific determinants of prenatal health care utilization regarding its consultation, timing, quality and

vaccination. As shown in the previous sections, the wide and unacceptable disparities in the residency as reflected by dummies for rural, urban and regional place of living is perhaps the most important determinant of prenatal health care utilization in Pakistan. Region, rural urban is significant in all of the four models of prenatal health care utilization. Thus living in urban area or region has a positive effect on the likelihood of the health care utilization. Women living in urban area have more chances to utilize prenatal care as compared to rural area females. Even if rural females utilize prenatal care, their first prenatal visit tends to occurred late i.e during the second or third trimester means after the third month of pregnancy rather within the three months of pregnancy. They also obtain lower quality of care by receiving fewer components of care or getting care from traditional or private sector. The effects of region are found significant in previous studies. The probability of the usage of consultation, timing, quality and vaccination increases if women lives in urban area or relatively more developed region of the country. (Alexandre et al 2005, Hibobv 2011, Titelay 2010). As there is lack of infrastructure of health care services in rural settings, so there is less utilization of prenatal health care services. (Fatmi 2002)

Women's education is also an important determinant of prenatal health care utilization. But it is significant in one f four models while in other three models education also has an expected direction i.e shows the positive association with prenatal care services regarding consultation, care received vaccination and first consulting month. It shows statistically significant results with first consulting month of utilization. Thus women with better education are more likely to receive the first consultation during first three months of pregnancy. More educated women seeks higher quality services and take first visit at early stage and have greater ability to use health care input to produce better health (White 2003, Beeckman 2010, 2011, Basani et al 2009, Hibobv 2011, Titelay et al).

Education may impact individual behavior regarding health care through number of possibilities including tendencies to educate people may take preventive care measures, greater health literacy and control over lives (Aleaxndre 2005). As education enhance the female decision making power and develop confidence and they are in position to take decision regarding their own health as well as their children health. Another explanation may be that as education increases awareness overall and so also increase awareness regarding health and health care utilization and uptake of health care at proper time from proper place.

Electricity is used as a proxy of social status of household. It is statistically significant in three out of four models of prenatal care utilization regarding consultation, care received and first consultation which means that as the facility of electricity increases in the household the level of prenatal health care utilization also increases. Increase in electricity facility means that there are increase in socio economic status means the product of electricity increases like fridge, television, computer and air-conditioned etc. previous studies have also proved that positive and strong association of electricity with utilization of prenatal care. (Fatmi 2001, Titelay et al 2010).

Women living in houses with presence of electricity are more likely to utilize prenatal health care. Electricity is statistically significant regarding consultation, care received quality and first consultation. Another explanation may be the presence of electricity at home is that the availability of electronic and modern media at home through which women gets awareness regarding health care.

Age of respondent is significant in two models of prenatal health care utilization. Age is positively associated with the first consultation visit while negatively associated with the tetanus toxiod vaccination received. Positive association shows that as age of women increases the first consulting visit also increases which means prenatal health care increases while negative association shows that as age of women increases TT vaccination received decreases which means prenatal health care decreases. As age is socially very important determinant of female health seeking behavior. The explanation of positive association may be that as age of female increases, level of awareness increases, information about health and health care increases and awareness about the contact with health care provider also increases. Older females are more likely to use maternal health care services as compared to younger one (White 2003, Fatmi 2002, Bassani 2009).

As female get the prenatal care services till a specific age limit means age of reproductive period. So, age square in one model out of four is negatively associated which means that as age of female increases, prenatal health care increases and reach at peak then starts to decline after the reproductive age. On the other hand, negative association of female age with vaccination can be explained as age of female increases vaccination received reduces which means less prenatal health care utilization. Younger females receive more care than older one, which can be explained as with the increase in maternal education, the level of awareness increases in maternal education the level of awareness increases in females at very early age and they receive much more care.

Birth order is significant only in one model for vaccination care received and have negative association with vaccination care received which may be explained as order /rank of birth of child increases; the vaccination care received reduces which means prenatal health care reduces. Females with high birth order reduce the likelihood of utilization (Hibobv 2011, Titelay et al 2010). A possible explanation of this may be as during their first pregnancy females are more conscious and cautious and therefore more try to seek prenatal health care while with the passage of time experienced confidence from previous pregnancies and negatively affect the probability of seeking care for subsequent pregnancies.

The above mentioned result is incorporated with the number of children. It is significant in consultation and care received and has negative association which means that as the number of children increases consultation or quality care received reduces which means prenatal health care reduces. The explanation of this may be as the number of children increases their socio economic status reduces and they receive less prenatal health care than before. Women with two or three

children were more likely to have received inadequate care than women with one child (Bassani 2009)

Source of drinking water is significant with consultation and quality care received and has an expected direction i.e positive association with prenatal care utilization which may be explained as the source of drinking water improves prenatal health care utilization increases.

Number of rooms is significant with vaccination care received and has expected direction i.e positive association with prenatal care utilization which may be explained as more the number of rooms in the house which shows the good condition or quality of house was increase the utilization of prenatal care services.

Sewerage is significant with prenatal consultation and has positive association with prenatal health care.

Region is important determinant of prenatal health care. Baluchistan is significant with the prenatal consultation like first consulting month and vaccination received. It shows negative association which means that disparities in each sector even at the household level, community level exist in this region. This is most remote region where socio political instability exist, literacy rate is low, female literacy rate is at very low level, urbanization is at very low rate, disparities in health and health care facilities like infant mortality rate and maternal mortality rate and in health expenditures exist at very high rate. Basic infrastructure of roads and transportation is not very sufficient for the economy development.

KPK is significant only in model four which is vaccination care received and appears with positive direction which means that health care facilities in KPK are much better than Baluchistan which is also significant in this model. A basic infrastructure of KPK is better than Baluchistan, Number of schools and NGO's are much more. Literacy rate and female literacy rate is much better. Health and health care facilities and health expenditures are much better now.

Punjab and Sindh are significant and positively related with quality care received which means that prenatal health care utilization is much better in Punjab and Sindh than any other region of Pakistan. As much of the health care facilities are provided in both of these provinces, literacy rate is much better in Punjab and Sindh. Basic infrastructure is more likely to be improved as compared to other regions.

5. Conclusion and Policy Implications

This study examines the determinants related to the utilization of prenatal care services among the women of reproductive age 15-49 years in Pakistan. It would be most appropriate to check the determinants of prenatal care in broader health seeking behavior of women of Pakistan belong to all the regions using microdata.

This study confirms previous findings given by (Hibobv 2010) that the utilization of maternal health care is a multistage process in which decisions are sequential. In our particular case, the factors affecting the utilization i.e consultation are different from factors affecting time of consultation and quality of care received which in turn different from the vaccination during current and previous pregnancy. Furthermore, we did not find any simultaneous se of determinants which must be significant for predicting all components of utilization. This renders multi modeling in predicting factors affecting prenatal care utilization.

The empirical evidence presented in this study has several important implications for health policy in Pakistan. The presented results demonstrate an inequality in the utilization of prenatal health care services especially in rural and urban area and in region context. These inequalities can be explained by the lack of mechanism of linkage between regional priorities and government health care expenditures by regions. (Hibobv 2011). The needs of region are not identified before the allocation of funds nor specific policy designed. Public expenditures on health care cannot be effectively used to urban or rural or regional disparities in the usage of prenatal care services. In contrast, such unequal allocation reinforces the existing regional inequalities.

Another key hurdle for health care utilization is lack of education. There is also exists substantial gender gap exist in schooling in Pakistan. Availability of electricity is also major obstacle in the utilization of health care services regarding consultation, timing of consultation and quality of care received. As availability of electricity provide different new techniques of awareness regarding maternal health care utilization.

Availability of safe drinking water is also a major determinant of health care utilization. So, in this regard source of drinking water is major hurdle in the provision of maternal health care utilization. As in different areas of Pakistan access to safe drinking water is very tough. Safe drinking water is best indicator to provide good health and health care utilization.

In the context of the interregional disparities exist at the national level, there should be much more focused on Baluchistan in all areas of social and economic sphere, for the purpose of development at national level. There should be changes in mechanism of allocation of scarce budgetary resources for health care. Budgetary allocation for prenatal should be taken into accounts the differences in the utilization of prenatal care and its quality.

Educational activities should increase in order to improve the utilization of prenatal care services in Pakistan. As there exist gender gap in Pakistan so, gender gap should diminish to increase the educational activities in Pakistan on equal gender basis and should also focus on the improvement in quality of education. Educational activities must be improved in rural areas as well as in urban areas in order to provide high quality prenatal care among rural women as well as in urban women. In this regard, ministry of health and education as well should take the initiative to create a special unit that will be responsible for the design and implementation of health education and health promotion programs. The developed programs should address the issue of prenatal care in comprehensive way that economy possess improved information and education of women on the benefits of usage, its timing as well as quality of care receive and vaccination.

As this study provides multi modeling, this process provides rich information for making informed decisions on the course of health care reforms. So, policy makers and health administrators should consider thee utilization of prenatal health care with one set of determinants like Baluchistan, electricity, region, source of drinking water, sewerage, total number of children. By contrast, timing of consultation should be considered as priority with another set of determinants like age, age square, region, Electricity and education.

Electricity should be provided in rural as well as in urban areas of different regions of Pakistan. Ministry of health should launch different awareness programs through electronic media so that people can get bundle of information even those who cannot read or write.

Proper source of drinking water should be provided in different areas which is safe for the health of people in order to improve the proper utilization of prenatal health care. Government should regulate the different sources of safe drinking water.

There is need to increase the tetanus vaccination coverage of mothers as a part of prenatal care services (Nisar and White 2003). There is also need to evaluate the health care services provided by the government sector and try to find out the reasons why women are not receiving government health services even though these services are provided at subsidized rates.

Social status of women is an important determinant. This study uses only current social status of women due to the cross sectional design of data and change in the social set up cannot be observed. Intervention to improve the social status of women of Pakistan may help to improve the prenatal care in Pakistan.

References

Agha Sohail and Thomas W Carton, (2011), Determinants of Institutional Delivery in Rural Jhang, Pakistan, International Journal for Equity and Health, 10:31

Alam, Ali Yawar, Akhtar Ali Qureshi, Malik Muhammad Adil And Hassan Ali, (2004), Factors Affecting Utilization Of Antenatal Care Among Women In Urban Slum Areas of Islamabad, Rawal Medical Journal,29, 71-75

Alexndar, Pierre Kebreau, Gilbert Saint Jean, Lee Cranddold and Etzer Ferine, (2005), Prenatal Care Utilization in Rural Areas and Urban Areas of Haiti, Rev Pannam Salud Publica/ American Journal of Public Health, 18(2), 84-92

Bassani Diego G, Pamela J.Surkan and Maria Tersa, (2009), Inadequate Use of Prenatal Services among Brazilian Women: The Role Of Maternal Characteristics, International Perspective On Sexual And Reproductive Health, 35(1), 15-20

Beeckman Katrin, Fred Louckx, Koen Putman, (2011), "Predisposing, Enabling and Pregnancy Related Determinants of Late Intiation of Prenatal Care, Maternal Child Health Journal, 15(7), 106-175

Beeckman Katrin, Fred Louckx, Koen Putman, (2010), Determinants of Number of Antenatal Visits in Metropolitan Region", Bmc Public Health, 10:527,

Fatmi, Z and B. I. Avan, (2002), Demographic, Socioeconomic and Environmental Determinants of Utilization of Antenatal Care In A Rural Setting of Sindh, Pakistan, Journal of Pakistan Medical Association, 52:138

Gazmararian, Julie A, Toyia L. Arringron, Cathy M. Bailey, Katy S. Schwarz and Jeffery P. Koplan, (1999), "Prenatal Care for Low Income Women Enrolled In Managed Care Organization, The American College of Obstetrics And Gynecology, 94(2), 177-184

Habibbov Nazim N And Lida Fan, (2008), Modeling Prenatal Health Care Utilization In Tajikstan Using A Two Stage Approach: Implications For Policy And Research, Health Policy And Planning, 23, 443-451

Habibov, Nazim N (2011), On The Socio Economic Determinants Of Antenatal Care Utilization In Azerbijan: Evidence And Policy Implications For Reforms, Health Economics, Policy And Law,6, 175-203

Heaman, M.J, Christine V Newburn Cook, Chirs G. Green, Lawrence J Elliot and Mihal E. Helawa, (2008), Inadequate Prenatal Care and Its Association with Adverse Pregnancy Outcomes: A Comparison of Indices, Bmc Pregnancy and Child Birth, 8:15,

Johonson, Allan A, Barbara J Hatcher, M Nabil El-Khorazaty, Rene A Milligan, Brinda Bhaskar, Margert F. Rodan, Leslie Richards, Barbara K. Wingrov, Haziel A. Laryea, (2007), Determinates Of Inadequate Prenatal Care Utilization By African American Women, Journal Of Health Care For Poor And Undeserved, 18, 619-635

Mora, J. O and Penlope S Nestel (2000), Improving Prenatal Nutrition in Developing Countries: Strategies, Prospectus and Challenges, The American Journal of Clinical Nutrition, 71, 1353s-1363s

Midhet, Farid, Stan Beckeer and Heinz W. Berndas, (1998), Contextual Determinants of Maternal Mortality in Rural Pakistan, Social Science Medicine, 46(2), 1587-1598

Mumtaz, Zubadida and Sarah M.Salway, (2007), Gender, Pregnancy and Uptake of Antenatal Care Services in Pakistan, Sociology of Health and Illness, 29(1), 1-26

Mikhail Blanche, (2000), Prenatal Care Utilization among Low Income African American Women, Journal of Community Health Nursing, 17(4), 235-246

Titlay, Christine R, Michal J Dibley and Christine L Roberts, (2010), Factors Associated With Underutilization of Antenatal Care Services in Indonesia: Results of Indonesia Demographic and Health Survey 2002/2003 and 2007, Bmc Public Health, 10:485

Wolfe, Matthew W (2006), Mother and Child: A Multi Determinant Model for Maternal and Infant Health Outcomes in Urban, Low Income Communities and Effectiveness of Prenatal Care and Other Interventions, Journal of Public and International Affairs, 17, 169-189

Zaid, Angelica, Judith T. Fullerton and Thomas Moore, (1996), Factors Affecting Access to Prenatal Care For Us/Mexico Border Dwelling Hispanic Women, Journal of Nurse Midwifery, 41(4),

Zerai Assata Nd Amy Ong Tussi, (2001), The Relationship between Prenatal Care and Subsequent Modern Contraceptive Use in Bolivia, Egypt and Thiland, African Journal of Reproductive Health, 5(2), 68-82

Zambarana, R. E, Christine Dunkel Schetter, Susan Scrimshaw, (1991), Factors Which Influence Use of Prenatal Care In Low Income Racial Ethnic Women In Los Angles County, Journal of Community Health, 16(5), 283-295