



Factors Affecting the Choice of Public Vs Private Healthcare Institutions for Delivery and Postnatal Care-A Study in a Rural District of Pakistan

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Maternal health is one of the most critical public health challenges in many developing countries availability of comprehensive maternal healthcare services by skilled health professionals can improve the quality of maternal health outcomes. In Pakistan, the rate of institutional delivery is lower than many other developing countries and a significant proportion of mothers seek maternal healthcare in the private health sector. There are many factors associated with utilization of maternal healthcare services including both supply side and demand side factors. The objective of this paper is to identify significant socio-economic factors affecting utilization of delivery and postnatal services in public and private healthcare facilities in district Rajanpur, Pakistan. Using multi-stage random sampling technique, 368 mothers who delivered within 6 months prior to data collection in selected basic health unit (BHU) areas were selected. Multivariate binary logistic regression was applied on primary data collected from Rajanpur district during 1st November, 2020 – 31st January, 2021. The results indicated that the household's preference for private healthcare sector for delivery and postnatal care increases with increase in households' education and incomes. It also showed that accessibility to healthcare facilities is significant in utilization of maternal healthcare services. Distance to healthcare facilities, cost of transport and out-of-pocket expenditure are significantly affecting the choice of healthcare institutions.

Keywords: Maternal healthcare; public health sector; private health sector; delivery; postnatal care.

1. INTRODUCTION

Maternal health is considered a significant public health challenge in many developing countries [1]. It is reported that about 295,000 women died due to causes related to pregnancies and childbirth in 2017 [2]. Approximately 830 women die every day from preventable causes related to pregnancy and childbirth worldwide [3]. It is also estimated that 99 % of maternal deaths occur in developing countries, and out of these, one-third of deaths occur in south Asia [3]. Also, maternal mortality is higher in women living in rural areas and among more impoverished communities than in urban areas [3]. High maternal and neonatal mortality rates in developing regions like Pakistan are linked to low rates of institutional deliveries [4]. In developing countries, it has been suggested that by providing skilled birth attendance (SBA), maternal deaths can be reduced up to 33% [5]. Evidence suggests that the availability of comprehensive maternal health care facilities with skilled health professionals to deliver emergency obstetrical and gynecological care services can improve the quality of maternal health care outcomes [6,7].

Maternal health services are provided by both public and private healthcare institutions in Pakistan. Despite the public healthcare services are much cheaper, there has been a growing tendency of utilizing private healthcare services in the country. This also hold true for maternal healthcare services. While the rich segment of the society has the benefits of high quality private healthcare facilities as well as highly subsidized public healthcare services; the poor segment on the other hand do not have access to private healthcare services due to many socio-economic barriers. The public healthcare services suffer from deficiencies in various supply side factors and as a result, the private health sector has been expanding rapidly, which may have a serious concern on sustainable development. The poor community who need access to affordable quality healthcare is the real victim of the unregulated private health sector in Pakistan as they spend a major share of their hardly earned income on private healthcare, making them more vulnerable. An understanding of significant determinants on maternal health services utilization may provide some policy responses to health policy makers to improve access to services. The objective of this paper is

to identify significant factors affecting utilization of delivery and postnatal services in public and private healthcare facilities in district Rajanpur, Pakistan.

1.1 Review of Literature

Utilization of maternal healthcare services is generally affected through a set of factors which are classified as demographic, socioeconomic and obstetric characteristics [8]. Inadequate services, poverty, distance to a health facility, lack of information, and cultural practices are some of those factors. Many studies in Asian and African countries have shown that women's education, household income, and geographical locations had the most significant effects on the utilization of maternal health services [9,10,11].

In developing countries, maternal health services utilization has been considered a public health challenge, particularly among the population belongs to vulnerable groups. Several studies in low-income countries attribute this to perceived barriers that prevent vulnerable populations from utilizing maternal and child health services. The barriers can be categorized as socioeconomic, community-related, and health systems-related. A systemic review of access barriers to maternal care in sub-Saharan African countries [12] showed that demand-side barriers like limited household income, unavailability of transportation, transportation costs, limited information on care providers, issues related to stigma and self-esteem, cultural belief and ignorance about required obstetric services influenced utilization of maternal health services. The review also identified many supply-side barriers such as out-of-pocket expenditure, distance to health facilities, poor knowledge and skills of health staff, poor referrals to higher-level health facilities, and poor interpersonal relationship with health staff are negatively affecting utilization of maternal health care in public health facilities.

Studies have shown that a mother's age is associated with the choice and utilization of maternal health care services in public or private hospitals. A recent study in Nepal by [13] based on three demographic health surveys showed that mothers with more years of schooling delivered at a private facility in all three surveys. Education of women is one of the significant factors influencing the decision to utilize delivery

and postnatal services from public or private health facilities. Mothers with a low level of schooling were less likely to avail themselves of modern maternal health services [14,15]. Govil et al. [16] suggest that high economic status and educational level are significant predictors of utilization of delivery care from the private hospitals and resulting OOPE. Mohanty and Kastor [17], showed that the educational attainment of women is positively and significantly associated with the utilization of delivery care and OOPE; a majority of respondents utilized private sources of care. In a study conducted in Punjab province, Khan and Noreen [8] also showed that the use of private health facilities for maternal health services increases with increasing education of mothers, including the socioeconomic status of the family. Tellis et al. [18] showed that the education of mothers and their spouses influence the choice of providers.

Economic factors strongly influence the household's decision to choose between public and private health facilities for delivery and postnatal care. From the perspectives of awareness and information, working women who have more awareness and information about maternal care, including quality and source of care, are likely to prefer the private sector. Working women generally have more physical and social mobility, so again, the private sector will be preferred. A study in Pakistan showed that women working in the agriculture sector had the lowest percentage (27%) of those who chose to deliver their babies at a health facility, whereas the largest proportion (54%) belonged to the women who served in the service sector [19]. The economic status of the mother represents her ability to afford the cost of maternal healthcare services. A study by Benova et al. [20] in 57 low and middle-income countries showed that 20% of deliveries occurred in private health facilities, which ranged from 9% to 46% across various countries. Based on the analysis of demographic health surveys of Nepal, Adhikari et al. [13] showed that higher family income was statistically significantly associated with the utilization of maternal health services in private health facilities.

Distance from the residence to health facilities does matter in the utilization of maternal health care services, especially in rural areas of developing countries. Studies have shown that the location and distance to facilities cost are often observed to negatively impact service

utilization. Lack of infrastructure such as roads and transportation in some countries makes it challenging for governments to ensure universal access to maternal health services. Studies have shown that transportation costs often negatively impact service utilization from public health facilities. Studies in Asian and African countries reported financial barriers in transportation as one of the reasons to avoid institutional delivery [21,22,23,24]. A study in India showed that cost of transportation and bad roads to the health facility were pointed out as the major barriers to accessibility, as about 50% of women in rural areas stated that the cost of transportation is the key barrier faced by most women respondents for the institutional delivery [25]. OOPE is one of the key factors associated with the utilization of delivery and postnatal services. These include costs incurred on medicine, surgery, diagnostics, and other hospital charges. Quite often women who deliver in public healthcare facilities have to spend a significant amount of money on purchase of drugs and supplies which are not available in these facilities. It also includes other costs such as transportation, food, accommodation, and informal payments while availing of healthcare services. Studies in South Asian countries have shown that OOPE is a major determinant in the utilization of maternal health care services for a significant number of women, including informal payment for services [25,26,27].

1.2 Theoretical Framework

In the past, several theoretical models have been developed to examine the factors affecting the health care utilization. In the context of maternal health services, Anderson's health services utilization theory [28], three delay theory by Barnes-Josiah et al. (1998) and the Ecological Theory of Bronfenbrenner (1979) are worth mentioning [29,30]. Andersen's health service utilization theory assumes that health care utilization can be viewed as a type of individual behaviour which are influenced by several socioeconomic, demographic, and health-related factors related to the individuals in question [31]. The theory categorizes these factors under two broad heads: predisposing factors and enabling factors, predisposing factors include demographic characteristics such as age, gender, marital status, and social factors like occupation, education, social network, culture, family size. Enabling factors refer to family and community resources that allow a person to utilize health services which include income,

availability of free services, sources of income, community health facility, cost of health care services. For the purpose of this research Anderson's, health care utilization was adopted.

2. METHODOLOGY

2.1 Sampling and Survey

This was a cross sectional study conducted in district Rajanpur, which is predominantly a rural district in Pakistan. All pregnant women who had registered with the Basic Health Units (BHUs) in Rajanpur district and delivered in health facilities (public or private) within the time period of 6 months prior to data collection. The minimum sample size for the study was determined using the formula $n = z^2pq/d^2$ where $z = 1.96$ at 95% confidence interval $p = 0.59$ (this is the proportion of institutional delivery in rural areas as per Pakistan Demographic and Health Survey 2017-2018) [32]. The minimum sample size thus estimated was 368 mothers. The study followed multistage random sampling technique to select the respondents from all the six Rural Health Centres (RHCs) in the district. From each RHC, three Basic Health Units (BHU) was randomly selected. List of pregnant women aged 15-49 years who had institutional delivery within six months prior to data collection in the BHU area were collected. From the list of delivered women from each BHU, 22 respondents were selected through simple random sampling technique, so as to reach the desired number.

2.2 Data Collection and Analysis

Data for the study was collected using a locally translated structured interview schedule. Draft interview schedule developed for the research was pilot tested among 20 respondents to ensure that it would be performing as intended. Data collection was done within the time period of 3 months by the researcher at the residence of the study participants. Every effort was made to contact all randomly selected women in the study. Enough care was taken to ensure the privacy and confidentiality of the participants and members of families. Data collection was carried out after obtaining written informed consent from the respondents. Primary data was analyzed through SPSS software and factors associated with utilization of delivery and postnatal care services in public vs private health institutions by multivariate binary logistic regression. In the

multivariate binary logistic regression analysis, the researcher used the category of the dependent variable as the place of delivery care (public hospitals vs. private hospitals). Independent variables considered in the model were mother's age, education of mother, occupation of the spouse, number of living children, family income, distance to the health facility, transport costs, OOPE. The multivariate logistic regression analysis helps us retrospect the possible reasons for utilization of delivery and postnatal services at public and private health facilities. The ethical approval for the study was given by UNIMAS medical ethics committee, Faculty of Medicine and Health Sciences, Universiti Malaysia Sarawak.

2.3 Model Specification

According to model specification under the Grossman (1972) model of demand for health-care, Anderson and Newman (2005) and Kroeger (1983) framework of health-care behavior function, the choice of public vs private health institution is the function of predisposing factors and enabling factors [33,34,35]. The study used multivariate binary logistic regression to determine the factors associated with decision to choose public vs private healthcare institution for delivery and postnatal care.

For multivariate logistic regression, the model becomes: - For a binary response variable 'Y', having 'k' number of independent variables ($X_1, X_2, X_3, \dots, X_i$)

We use $\log(X)$ to represent the probability that $Y=1$ for choosing public healthcare facility for delivery care and $1 - \log(X)$ to represent the probability of using private healthcare facility for delivery ($Y=0$). These probabilities are written as:

$$\begin{aligned} \log(X) &= P(Y=1/ X_1, X_2, \dots, X_i) \\ 1-\log(X) &= P(Y=0/ X_1, X_2, \dots, X_i) \end{aligned}$$

To summarize, the two basic equations of multivariate logistic regression are:

$$\log(X) = \frac{e^{\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_i X_i}}{1 + e^{\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_i X_i}}$$

$\log(\text{Place}) = \beta_0 + \beta_1 \text{Age} + \beta_2 \text{Education mother} + \beta_3 \text{Occupation mother} + \beta_4 \text{Occupation Spouse} + \beta_5 \text{FamilyIncome} + \beta_6 \text{Noofchildrenliving} + \beta_7 \text{distancetohealthfacility} + \beta_8 \text{transport charges} + \beta_9 \text{otofpocketmedicalexpenditures}$.

Table 1. Measurement and operational definition of variables

Variables	Definition
Dependent Variable	
Choice of healthcare facility	If the mother receives delivery services from public sector institution = 1, otherwise (from private institution) = 0
Independent Variables	
Age of Mother	< 20 years =1, 20-30 years =2, 31-40 years=3, 41 and above = 4
Education of Mother	No schooling =1, 1 -5 years schooling=2, 6-10 years schooling =3, above 10 years of schooling = 4
Occupation of Mother	Housewife =1, Government service =2, Private/self employed=3
Occupation of Spouse	Unemployed=1, Government employee=2, private/contract =3, daily labour =4, self-employed =5
Family Income	<PKR10000=1, PKR10,000 -20,000 =2, PKR 20,001-30,000=3, above PKR 30,000 = 4
No of Living Children	1 – 2 children=1, 3-4 children=2, 5-10 children=3, 11 and above =4
Distance to Health Facility	<10 km =1, 10-12 km=2, 21-30km=3, above 30 km=4
Transport Charges Out of Pocket	No Expense=1, < PKR 500 =2, PKR500-1000=3, above PKR 1000 = 4
Medical Expense	<PKR2000 =1, PKR2000-5000=2, PKR 5001-10000=3, above PKR 10,000 =4

3. RESULTS

3.1 Socio-demographic Information of the Mothers

This section provides an overall view of the socio-demographic characteristics of mothers included in the study.

Table 1 presents information on individual characteristics of mothers of the selected BHU area, aged 15-49 years, who had delivered within a period of six to twelve weeks before the date of the interview. The mean age of the mother was approximately 28.3 years, with more than 60% of them being between 20 to 30 years. Of them, 59.5% did not have any schooling, 16% had primary schooling, 16.6% had secondary level schooling, and the rest had higher secondary education. A majority of the mothers (85.6%) were housewives. Within the work profile of spouses, most of them were daily wage earners (51%) and self-employed (25.8%). The household income of the respondents revealed that almost 54% of them had lower than 10000 PKR. Only a negligible number of households (3 nos) was covered by any health insurance scheme.

3.2 Choice of Delivery in Public VS Private Health Facilities

The results of logistic regression in Table 3 revealed that the mother's age has a significant

role in choosing public vs private health facilities for delivery care. Mothers in a lower age group had lower odds of utilizing public sector facilities than the private sector. This means mothers in the younger age group are less likely to use public healthcare facilities for delivery care compared to the higher age group. Younger mothers who belong to lower than 20 years are more than 99 percent less likely to use public health facilities than the reference age group (age 41 and above). The mother's level of education has a significant effect on the choice of the type of facility. The analysis indicates that as the educational level increases, facility preference is more likely to be private. The results show that mothers with more years of schooling had lower odds of utilizing public sector facilities than the private sector.

Mothers who are employed in the government or private services are less likely to choose public facilities than who are housewives. This also holds for the occupation of spouse, as the results indicates that spouses who were employed in the government or private sector had a lower odds of utilizing public facilities, while daily labors (OR=1.10) and self-employed households (OR=1.28) were more likely to prefer public health facility for delivery care. Family income is another significant factor in choosing the type of health facility for delivery care. When family income increases, the preference for health facilities is more likely to be private. In other words, the higher family income had lower odds of choosing the public sector hospital for delivery

care. The number of living children is another factor affecting the choice of health facility for delivery care. The analysis showed that mothers with more living children had greater odds of choosing the public sector hospital for their child births. Compared to less number of living children, mothers with 3-4

children were a 52 percent higher chance of going to public health facility and those who had 5-10 children were more than two times higher chance (OR=2.82) of preferring public health facilities compared to the reference category (i.e., those who have 1 to 2 children).

Table 2. Socio-demographic characteristics of mothers (n=368)

Variables	No.	%
Age group of mothers		
<19 years	20	5.4
20 - 25 year	121	32.8
26-30 years	109	29.6
31-35 years	65	17.6
36-40 years	30	8.2
>40 years	23	6.3
Education of mothers		
No schooling	219	59.5
Primary (1-5 years)	59	16.0
Secondary (6-10 years)	61	16.6
Higher secondary (11-12 years)	13	3.5
Above 12th	16	4.4
Occupation of mothers		
Housewife	315	85.6
Permanent employee private	4	1.1
Permanent employee government	25	6.8
Contract employee	3	0.8
Daily wage earner	11	3.0
Self-employed	10	2.7
Occupation of the head of the household		
Unemployed	18	4.9
Regular employee private sector	12	3.4
Regular employee government	38	10.3
Contract employee	15	4.0
Daily wage earner	188	51.0
Self-employed	95	25.8
Retired	2	0.5
Household monthly income		
below 10000	200	54.3
10001 - 20000	74	20.1
20001 - 30000	45	12.2
30001 - 40000	17	4.7
40001 - 50000	20	5.4
Above 50001	12	3.2
Insurance coverage to any member of the household		
Yes	3	0.8
No	365	99.2

- Average household earning members = (1.27 ±0.54)

- Average number of family members = (3.40 ±2.11)

Table 3. Logistic regression analysis for factors determining the Choice of Health Facilities for Place of Delivery Care (Public vs.Private)

Variables	Categories	Odds Ratio	CI (95%)	Sig.
Age of Mother	< 20	0.003	(0.00 -5.07)	0.153
	20-30	0.037	(0.00 - 6.27)	0.130
	31-40	0.057*	(0.00- 2.47)	0.025
	41 and above ®	1.00		0.520
Education of Mother	No Schooling ®	1.00		0.820
	1 -5 yrs Schooling	0.619	(0.09- 4.10)	0.619
	6-10 yrs schooling	0.021*	(0.00 -2.31)	0.045
	Above 10 yrs Schooling	0.010*	(0.00 – 2.39)	0.049
Occupation of mother	Housewife ®	1.00		0.462
	Government Service	0.025	(0.00 – 1.92)	0.993
	Private/Self Employed	0.090	(0.02 – 4.01)	0.214
Occupation of Spouse	Unemployed®			0.118
	Government Employee	0.050*	(0.00 – 1.41)	0.196
	Private/Contract	0.076	(0.00 – 2.23)	0.161
	Daily labour	1.105*	(0.01 -1.48)	0.010
	Self Employed	1.280**	(0.83 – 1.52)	0.008
Family Income	< 10000®	1.00		0.887
	10,000-20,000	0.813*	(0.21 – 2.34)	0.048
	20,001 - 30,000	0.855*	(0.16 – 3.51)	0.047
	Above 30,000	0.365**	(0.01 – 5.17)	0.013
No of Living Children	1 - 2 ®	1.00		0.525
	3- 4	1.525*	(0.18 – 2.26)	0.049
	5-10	2.838*	(0.45 – 5.21)	0.038
	11 and Above	2.444*	(0.02 – 6.54)	0.025
Distance to Health Facility	<10 ®	1.00		0.100
	10 -20km	0.955	(0.11 – 3.81)	0.966
	21-30km	1.511	(0.44 – 4.67)	0.819
	Above 40 km	4.483**	(1.06 – 8.43)	0.014
Transport Charges	No Expense®	1.00		0.136
	< Rs. 500	0.022*	(0.00 – 1.49)	0.038
	500-1000	0.035**	(0.00 – 2.21)	0.009
	Above Rs. 1000	0.036*	(0.00 – 2.58)	0.042
Out of Pocket Medical Expense	< 2000 ®	1.00**		.001
	2000-5000	0.031*	(0.00 – 3.21)	.043
	5001-10000	0.045*	(0.00 – 4.38)	.047
	Above 10,000	0.052*	(0.00 - 4.95)	.039

Note: * $p < 0.05$ and ** $p < 0.01$, ® Reference Category

Distance from home to a health facility is considered an essential factor affecting the choice of health facility for delivery care. The results indicate that the higher the distance to a health facility, the higher the likelihood of families choosing public health facilities for delivery care. The mothers living farther from the health facilities had greater odds of choosing public health facilities for delivery care. Mothers living more than 40 km from health facilities are more than four times more likely to choose public health facilities for delivery care than those living within 10 kilometers' distance. Travel expenses to be incurred by the families are likely to affect

the decision to choose a health facility for seeking delivery care. The results indicate that when the travel expense increases, the preference of facility is more likely to be a private facility, which means most mothers who visited public health facilities had utilized ambulance services from the government hospitals. Finally, OOPE indicates that mothers who spent more on delivery care had lower odds of choosing a public health facility for delivery care. The results indicate that mothers who spent PKR.2000 and above were less likely to choose public facilities than those with low medical expenses.

3.3 Choice of Postnatal Care in Public VS Private Health Facilities

The logistic regression analysis results in Table 4 reveal that the mother's age does not have a statistically significant association in choosing a facility for postnatal care. However, middle-aged women had higher odds of utilizing public sector facilities for postnatal care than the reference category (age 41 and above). The level of education of the mother has a significant effect on deciding the place of postnatal care. The analysis indicates that as educational level increases, facility preference is more likely

to be public as the odds of using the public sector for postnatal care are more than two times higher for more educated mothers than uneducated mothers. As far as mother occupation is concerned, the results show that mothers employed in the government services are less likely to choose public facilities for postnatal care than other occupational groups. However, the results reveal that the likelihood of using public sector hospitals for postnatal care is more than two times higher (OR=2.42) among women employed in the private sector and self-employed.

Table 4. Logistic regression analysis for factors determining the Choice of Health Facilities for Place of Postnatal Care (Public vs. Private)

Variables	Categories	OR	CI (95%)	Sig.
Age of Mother	< 20	0.840	(0.17 – 4.17)	0.831
	20-30	1.062	(0.33 – 3.47)	0.921
	31-40	1.830	(0.55 – 6.11)	0.326
	41 and above ®	1.00		0.398
Education of Mother	No Schooling ®	1.00		0.468
	1 -5 yrs Schooling	1.166	(0.59 – 2.32)	0.661
	6-10 yrs schooling	2.118**	(0.84 – 5.35)	0.012
	Above 10 yrs Schooling	2.440*	(0.44 – 5.64)	0.048
Occupation of mother	Housewife ®	1.00		0.015
	Government Service	0.274*	(0.80 – 0.94)	0.040
	Private/Self Employed	2.422	(0.86 – 6.86)	0.096
Occupation of Head	Unemployed®	1.00		0.010
	Government Employee	4.891*	(0.92 – 15.23)	0.043
	Private/Contract	2.339	(0.37 – 14.79)	0.367
	Daily labour	1.105	(0.31 – 3.91)	0.877
	Self Employed	3.663*	(0.90 – 14.85)	.048
Family Income	< 10000®	1.00		.019
	10,000-20,000	0.693	(0.34 – 1.42)	0.316
	20,001 - 30,000	0.243**	(0.09 – 0.66)	0.005
	Above 30,000	0.262**	(0.09 – 0.72)	0.009
No of Children	1 - 2 ®	1.00		0.006
	3- 4	0.374*	(0.16 – 0.90)	0.028
	5-10	0.360*	(0.16 – 0.82)	0.014
	11 and Above	0.151***	(0.05 – 0.43)	0.000
	<10 ®	1.00		
Distance to Health Facility	10 -20km	1.728	(0.85 – 3.53)	0.134
	21-30km	0.893	(0.31 -2.55)	0.832
	Above 40 km	0.690	(0.20 – 2.35)	0.553
	< 2000 ®	1.00		0.298
Out of Pocket Medical Expense	2000-5000	0.654	(0.32 – 1.33)	0.243
	5001-10000	0.805	(0.17 - 3.85)	0.786
	Above 10,000	1.811*	(0.34 – 9.67)	0.047
	No Expense ®	1.00		0.309
Transport Cost	< 500	1.545	(0.49 – 4.81)	0.453
	500-1000	0.952	(0.28 – 3.20)	0.936
	Above 1000	2.774	(0.59 – 12.95)	0.194

Note: * $p < 0.05$ and ** $p < 0.01$, *** $p < 0.001$ ® Reference Category

Contrary to these results, the spouse's occupation has a significant role in deciding to avail of postnatal care from the public sector. Women whose spouses employed in the government services are almost 4 times higher chance to choose public sector (OR=4.81) for postnatal care, those employed in the private services are 2 times more likely to use postnatal care from the public sector, and women whose spouses were self-employed were 3 times more likely to choose public sector hospitals compared to unemployed spouses, and it is statistically significant also. Like choosing a health facility for delivery care, family income is another highly significant factor in choosing the type of health facility for postnatal care. When family income increases, the preference of health facilities for postnatal care is more likely to be private and highly significant ($p < 0.009$). In other words, the higher family income had lower odds of choosing the public sector hospital for postnatal care. The number of living children is another contributing factor for choosing the health facility for postnatal care. Mothers with more living children had lower odds of choosing the public sector hospital for the delivery of care. Compared to less number of living children, mothers with 3-4 children were a 63 percent lower chance of going to the public health facility for postnatal care, and those who had 5-10 children were a 64% lower chance of preferring public health facilities compared to the reference category (i.e., those who have 1 to 2 children). Women who had 11 children or more are 85% less likely to choose public facilities than those who had 1 to 2 children, and it is statistically highly significant also ($p < 0.00$).

Although the distance from home to a health facility is considered an essential factor affecting the choice of health facility, the results indicate that distance to a health facility had a limited role in choosing public health facility for delivery care. The mothers living farther from the health facilities were less likely to choose public health facilities for postnatal care. Travel expenses incurred by the families are likely to affect choosing a health facility for seeking postnatal care. The analysis indicates that when the travel expense increases, the facility's preference is more likely to be a public facility, which means most mothers who visited public health facilities for postnatal care had to incur huge expenses on transport. However, most of them had availed free ambulance services for delivery care. Finally, mothers who spent more on delivery care had greater odds of choosing a public health facility for postnatal care. The results indicate

that mothers who spent PKR.1000 and above were more likely to choose public facilities than those with low medical expenses.

4. DISCUSSION

The overall results of multivariate logistic regression analysis indicate that there seems a clear preference for the public sector health facilities for delivery care among women of higher age group, low education, housewife, low job category of spouses, lower economic strata, living far from health facility and low transport expenses. Likewise, there seems a clear preference for the public sector health facilities for postnatal care among women with higher education, employed in government services, government/private service or self-employed spouses, higher economic strata, living far from health facility, high transport expenses and overall OOPE. The logistic regression analysis enables us retrospect the possible reasons for utilization of postnatal services at public and private health facilities in the district.

The analysis has shown that educational level of women and her spouse have emerged as one of the significant determinants of choice between public and private health facilities for delivery and postnatal care. The finding of this study is corroborated by Pomeroy, et al (2010) has shown that women's education positively influences the use of private healthcare facilities for maternal healthcare in developing countries [36]. Existing literature shows that education improves the awareness of women about quality healthcare services and utilization of maternal health services from the private healthcare institutions. This finding is in line with findings of other studies (Govil et al. 2016; Mohanty and Kastor, 2017) suggesting that educational level of women is significant predictors of utilization of delivery care from the private hospitals [16,17].

Occupation of spouse not only improve the quality consciousness but also the use of healthcare services in the private health sector. The analysis showed that women whose spouses are working in government sector are more likely to choose private healthcare facilities for delivery care, whereas those working in informal sector are more likely to prefer public healthcare facilities for delivery and postnatal care. Similar findings were shown by studies conducted by Khan and Noreen (2016) and Hussain et al (2018) in Pakistan [8,37]. Studies conducted by Chhetri et al, (2020) in Nepal and

Tellis et al (2018) in India [38,18] also showed that education of spouses influences the choice of healthcare institutions.

Family income is one of the factors which decide the choice of institution for delivery and postnatal care [8]. The present study revealed that women from the high income bracket are more likely to choose private healthcare facilities for delivery and postnatal care. In other words, for women from the high income families the use of maternal health care at public healthcare facilities is an inferior good; whereas for low income families access to maternal care in the private health sector is restricted due to affordability issues. This finding is supported by a study in Nepal [13] which showed that women belong to richest households were more than seven times as likely to have delivered their child at a private hospital as compared with women from the poorest households. Studies conducted in other countries have also shown that economic factors strongly influence the household's decision to choose between public and private health facilities for delivery and postnatal care [39,40].

The study also observed that mothers with more children are most likely to utilize maternal care from the public healthcare facilities. This finding was in line with study of Hollowell et al. (2011) which concluded that in a first pregnancy, perception of risk increased the utilization of maternal healthcare services in private health facilities than in later pregnancies [41]. This finding is in contrast to findings of other studies in India [22] and China [42] found that mothers having more children enhanced the utilization of institutional delivery. However, finding of the study in respect of postnatal care utilization in private health facilities has been supported by these studies.

The study found that distance from the residence to healthcare facilities does matter in the decision to choose healthcare institutions, especially in rural areas. In this study, although distance is not significantly affecting the decision, but cost of transport is a significant factor in choosing the healthcare facility. This finding is corroborated by findings of other studies in India [43], Nepal [44] and in Pakistan [40].

The study also pointed out that out-of-pocket expenditure (OOPE) is one of the key factors associated with the utilization of delivery and postnatal services. These include costs

incurred on purchase of medicine, surgery, diagnostics, and other hospital charges. It also includes other costs such as transportation, food, accommodation, and informal payments while availing of healthcare services. The study showed that households which spent higher OOPE are more likely to utilize private healthcare facilities for both delivery and postnatal care. These findings are also corroborated by other studies [45,26] that have shown that use of maternal healthcare services from public vs. private facilities are largely influenced by cost considerations.

5. CONCLUSION

The objective of the study was to identify the significant factors which determines the choice of public or private healthcare institutions for delivery and postnatal care. The results of the study showed a clear preference for the public healthcare facilities for delivery care among women of higher age group, low education, whose spouses employed in informal sector, belonging to lower economic strata, having more number of children. On the other hand, mothers with high education, spouses employed in government service or self- employed, and incurred high OOPE on delivery care are most likely to use postnatal care from public healthcare facilities. The results further indicate that OOPE is the major barrier in utilizing maternal healthcare services in both public and private healthcare facilities by the women in low socio-economic category. Therefore, it is important to address this barrier by improving access to quality maternal healthcare services in government healthcare facilities. Improved access to government healthcare services not only increases institutional deliveries, but also encourages women to seek postnatal care and thus improves maternal health outcomes.

CONSENT

Data collection was carried out after obtaining written informed consent from the respondents.

ETHICAL APPROVAL

The ethical approval for the study was given by UNIMAS medical ethics committee, Faculty of Medicine and Health Sciences, Universiti Malaysia Sarawak vide letter no. UNIMAS/NC-21.02/03-02 Jld.4(35), dated 17th January 2020.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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