Factors influencing the utilisation of public health services for maternal care in India: evidence from National Sample Survey

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Abstract:
In India, the utilisation of public healthcare units for maternity care are declined in recent days, although both the public and private sector plays a significant role in delivering medical services in the country. Therefore, the present study has aimed to explore the factors responsible for the decline in the utilisation of public health services for maternity care by using 75th round NSSO unit-level data (2017-18) on health. Standard binary probit models have used to identify the important socio-economic and demographic factors that enabled the women to utilise public health services for their maternity care. The study found that low-income states lag behind high-income states in utilising health services in the country due to a lack of health infrastructure and a shortage of medical professionals. In a similar context, low literacy and less awareness among the households also influence the utilisation of health facilities for maternal care. The econometric analysis suggests that women of lower strata mainly belonging to the rural sector, minority community and vulnerable category have preferred public healthcare units for maternal care, while the employment status coupled with better education in the household would restrict them to use public health services in the country.

Keywords: Literacy, public health, maternal care, minority community, women, vulnerable category.

Introduction: It is well known that developing countries far lag behind developed countries in providing basic health services to their people. Despite enormous public and private investment in the health sector, these countries remained poor in terms of the provision of health services. However, the progresses of health services critically depend on the availability and accessibility of the health care system, which ultimately helps the nation to reach the path of development. Therefore, it is very hard to deny the fact that low utilisation of basic health services has an adverse impact on the effectiveness of the state, which in turn significantly affects the reproductive health of mothers and newborn children. In today's world, maternal healthcare services make a significant contribution to the

development of the economy; low maternal mortality and low infant mortality boost the economy by providing human capital for the future.

The country-India has witnessed significant progress in the reduction of maternal mortality as well as infant mortality during the last three decades. However, a certain percentage of women of the country, nowadays, are less interested to utilise public health services for prenatal care, institutional delivery and postnatal care (Shariff & Singh 2002) despite such significant improvements in the reproductive health of women. This is mainly because of improvements in Private Healthcare units in the country. Many researchers argue that a certain percentage of women prefer Private Healthcare units by expecting that they provide quality health services than public units (Anand & Sinha, 2010). Contrariwise, it is also a fact that the lack of awareness among the people, lack of adequate care during pregnancy from the family and sometimes unhygienic care of a newborn child are also the causes of less use of healthcare units for maternal care (Bwalyal, et al., 2017). Many researchers pointed out that good maternal healthcare units always have a low risk of maternal and neonatal mortality (Heuvel, et al., 1999; Neeta, et al., 2018). Meanwhile, the likelihood of attaining maternal care is expected to be increased if the country has reduced the socio-economic, religious and ethnic disparity among the people of the nation (Sado, et al., 2014). Many researchers found that participation in maternal health care services in India is bounded by inconsistent and irregular visits to health centres; in this context, pregnant women would be able to take necessary care during pregnancy if they have a decent education (Raghupathy 1996; Ali & Chauhan, 2020; Babalola and Fatusi, 2009). This would cause them to visit the nearest healthcare unit (for antenatal care) at regular intervals. The location of health centres also has an important dimension in the utilisation of maternal health services (Wong, 1987; Gage, 2007). Poor infrastructure has reduced the probability of attaining maternal health care (Gage & Calixte, 2006). In India, rural health services are mostly dependent on public health centres (PHCs), and these centres regularly face a lack of trained professionals. As a result, women would be compelled to attend the nearest district Hospitals where a large number of trained professionals are present. However, they may be reluctant to seek maternal care at these hospitals even though this requires certain expenditures of them. In this context, it is very hard for them to utilise maternal healthcare services properly in the country without a decent level of income (Elo, 1992; Fosu, 1994). Therefore, the combining availability and accessibility of healthcare units (Navaneetham & Dharmalingam 2002) coupled with adequate awareness of the households regarding maternal health might motivate pregnant women to attend healthcare consistently (Mahajan & Sharma 2014; Fosu 1994). Therefore, the availability and accessibility of the health sector are major determinants in utilising health services in the country (Chakraborty et al., 2003). In contrast, the household wealth is also an important factor in utilising health services consistently (Celik and Hotchkiss, 2000). Some researchers also argue that the mother's needs are more important to attaining health check-ups at regular intervals (Azevedo et al., 1991). The increasing autonomy of working women also increased the need for quality health services (Woldemicael, 2010; Kamiya, 2011)

which is also assumed to motivate them to choose efficient healthcare services for their own maternal health (Kamiya, 2011; Kc & Neupane, 2016).

Thus, various socio-economic and demographic factors contributed significantly to the utilisation of public health services for maternal care. The higher socio-economic gap in the country also influences the utilisation of public health services. The rural-urban infrastructural differences also have some adverse impacts on the utilisation of public health services. Nonetheless, very few studies have shown how socio-economic and demographic factors affect the utilisation of public health services for maternal care in the country. Hence, it is necessary to identify the factors that promote the utilisation of public health services for maternal care. The present study has raised some important questions; How do regional variations of the country affect the utilisation of public health services for maternal care? To what extent does the socio-economic and demographic status of the women determine the utilisation of public health services for maternal care? Based on these research questions, the present study tries to explain the following objectives;

To understand the pattern of utilisation of public health services across the regions of the country;

To investigate the determinants of the utilisation of public health facilities for pre-natal and post-natal in the country.

Methodology and Data Description: The present study has used the 75th round NSSO unit-level data (2017-18) on Health. The NSSO has collected all-round information on the health of the people of different rural and urban sectors in India, the pregnancy data of the women between the ages of 15-49 has been truncated for the analysis. The NSSO has collected health-related information from 1,48,188 women in the age groups of 15-49; out of these only 32,151 women were found pregnant during the last 365 days of data collection. The report of 75th round data highlighted that the pregnancy rate is high in the eastern region of the country where the most of the states witnessed low per-capita income and slow growth rate. In contrast, the country witnessed a higher pregnancy rate among the women of vulnerable sections of SC/ST as well as Muslim community. Importantly, the notable thing is that the pregnancy rate is higher among the aged women, which describes their awareness regarding maternal health.

In the methodological section, the study has two parts; in the first part, the pattern of utilisation of public health services regarding prenatal and postnatal care across the different regions of the country has been discussed. In this context, the percentage women received public health services for pre and postnatal care have been computed. To do this, the following formula is used in the analysis.

Percentage of women have used the public health facilities

$$= \frac{\text{Total number of women have used public health facilities for maternal care}}{\text{Total number of pregnant women in that categroy}} \times 100$$

In the final section, the socio-economic factors influencing the utilisation of public health services for maternal care has been illustrated. The prenatal, postnatal care and the characteristics of delivery are identified as crucial in maternal health. Besides, the public health services contributed significantly to improve the maternal health, therefore, regression analyses have been carried out for the utilisation of public health services for prenatal care and postnatal care. However, as the dependent variable is binary, i.e., it will take 1 if the women have used the public health care services for prenatal and postnatal, and take 0 for others, the present study has applied the generalised linear model with probit link function to examine the association of the socio-economic factors to the binary dependent variables. The following regression model has been used in the study;

$$y_i^* = \gamma_0 + \delta \ln \partial_i + \beta \ln n_i + \vartheta \sum H_i + \alpha \sum I_i + \varepsilon_i \qquad \text{…(i)}$$

Where y_i^* is the unobserved latent variable and the observed y_i can be defined by,

$$y_i = \begin{cases} 1 = \text{if women take the public health services} \\ \qquad\qquad \text{for maternity health care, then } y_i^* > 0 \\ 0 = \text{for others} \end{cases}$$

and ∂_i is the share of expenditure for maternity health care to total annual consumption expenditure, n_i is the size of the household, H_i is the characteristics of the households like religion, caste, average years of education etc., I_i is the individual characteristics of women like age, education and employment.

In the generalized linear model with probit link function, it is assumed that ε_i is drawn from a standard normal distribution with zero mean, unique variance and correlation coefficient ρ. The maximum likelihood estimation is used to estimate the parameter and correlation coefficient.

Data description and variable used: In the maternity health care household is the only decision unit in which the members of the household collectively decides whether the public health care services will be used or not. In India the public health care units as well as private health care units simultaneously provided the maternity health care services to the people of the nation and people will choose one of them for maternal health care. However, the private health care services are much expensive than the public health care unit, nonetheless many households will prefer private health care unit for quality services. In this regard, it is assumed that there are various socio-economic as well as individual factors that stimulates the household to choose private health care unit for maternal health than public unit. Hence to identify important socio-economic as well as individual factors in utilisation of public health care units, the following variables have been used as explanatory variable to facilitate the research work.

Variables used in the binary probit regression analysis:

Abbreviations	Variables
Household size (HS)	Natural logarithm of number of Household size
$\delta^{shexp.}$	Natural logarithm of share of health expenditure to total consumption expenditure
AYRSEDU	Average years of education of the household
age^{21-35}	$age^{21-35} = P_1 = 1$, if the woman belongs to the age between 21-35 and 0 otherwise.
age^{36-49}	$age^{36-49} = P_2 = 1$, if the woman belongs to the age between 36-49 and 0 otherwise.
age^{15-20}	age^{15-20} is the reference category.
Age^2	Square of the age of pregnant women
$Sector\ of\ origin\ (SE)$	$SE = P_3 = 1$, if the woman belongs to rural area and 0 otherwise, urban area is the reference category.
$Minority\ community\ (MC)$	$MC = P_4 = 1$, if the woman belongs to minority community and 0 otherwise, the Hindu religion is the reference category.
$Vulnerable\ category\ (VC)$	$VC = P_5 = 1$, if the women belong to vulnerable category of SC/ST and 0 otherwise, the non-vulnerable category is the reference category.
$Head\ of\ the\ household = HH^h$	$HH^h = P_6 = 1$, if woman belongs to the female headed household and 0 otherwise, male headed household is the reference category.
$Employment\ status\ of\ women\ (Emp$	$Emp^{pw} = P_7 = 1$, if the woman contains an employment status and 0 otherwise, others have been selected as reference category.

The dummy variables $P_1, P_2, ... P_7$ and scale variables HS, AYRSEDU, δ^{shexp} and Age^2 have been used in the models of the study. Hence the equation (i) can be extended as follows,

$$y_i = \beta_0 + \sum_{j=1}^{7} \beta_j P_j + \beta_j HS + \beta_j AYRESEDU + \beta_j Age^2 + \beta_j \delta^{shexp} + \varepsilon_i \qquad …(ii)$$

The binary probit regression model can be estimated by using the above equation to determine the factors of utilisation of maternal care in India. The present study has used the individual level data of the pregnant woman for the analysis $y = 1$ indicates the women have used maternal care from public sector during pregnancy and $y = 0$ for others. The

maximum likelihood method is used to determine the parameters and coefficient. Lastly, Pearson chi-square test has been used to test whether the model is fit for the data of above explanatory variables.

Result and Discussion:

Utilisation of public health services for maternity health care: The utilisation of health services for maternity care in India are improving remarkably in the last three decades; for prenatal care, it has increased from 70.8 per cent in 1995-96 (according to the 52nd round of NSSO data) to 86.6 per cent in 2004 (according to 60th round of NSSO data), and reached to 90.80 per cent (according to 75th round of NSSO data) in 2017-18, while it has increased from 28.3 per cent in 1995-96 (according to 52nd round of NSSO data) to 90.97 per cent (according to 75th round of NSSO data) for the postnatal care. The poor awareness and limited access to health services were the reasons behind the less utilisation of health services for maternity care. However, as the policymakers gave more emphasis on maternity care, the country witnessed rapid progress in it. This progress is thought to be attributable to increased education, as well as greater awareness among women about health.

In recent days, there have been significant changes in the use of public health services, especially among women across the states of India. The more developed states have better private health infrastructure and access to modern facilities which stimulate the individuals to rely heavily on these facilities. Meanwhile, the lack of these resources in less developed states forces individual to use public health facilities for medical treatments. As a result, Individuals in less developed states often have to travel more to advanced states for medical treatment. This pattern is also observed in maternity care; the women in advanced states preferring private healthcare, while women in less developed states rely more on public health facilities. This can be clear when the study compares the utilisation of public health facilities across different regions of the country.

Figure 1 illustrates the utilisation of public health facilities for pre-natal and post-natal care across the country. In India, 66.21 per cent of women have utilised public health facilities for pre-natal, while only 60.03 per cent have utilised it for postnatal care, which reveals that a certain percentage of women prefer private healthcare facilities for maternity care. The result also demonstrates that the women of the Southern region have less utilised the public health facilities, whereas the women of the North-eastern region use it broadly. The Southern and Western regions are well equipped with private medical facilities; hence women rely on this sector for medical treatment. It could be the fact that lower poverty, higher per-capita income and better employment status also encourage them to use private healthcare facilities. Additionally, women across most regions show a preference for private health facilities for postnatal care. The higher complications after pregnancy might stimulate them to use private health facilities largely.

Table 1: Utilisation of public health facilities for maternity care

Utilisation of public health facilities for maternity care
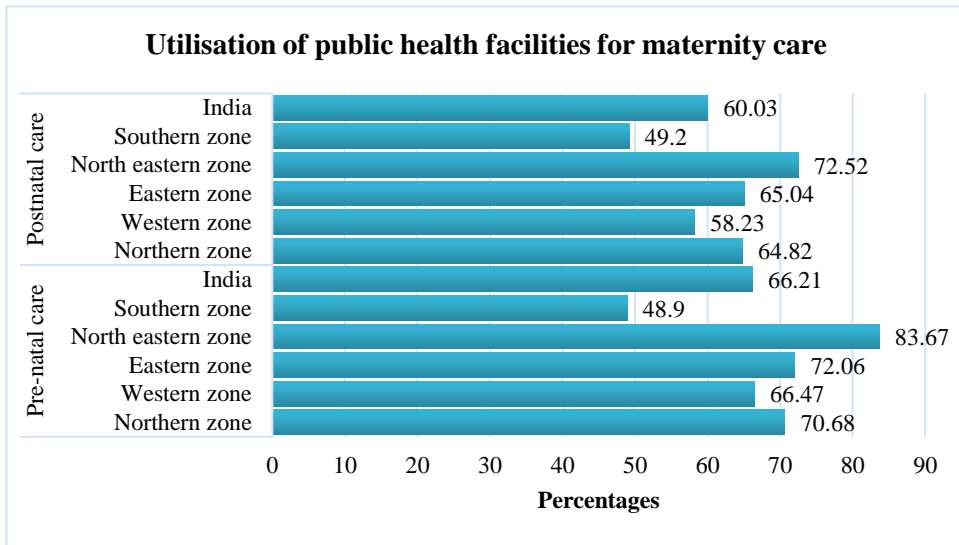
Source: 75th round NSSO unit level data (2017-18) of health expenditure

Thus, the result reveals that in most regions of the country, the women are preferring public health facilities for their maternity care while some regions witness different outcome. Therefore, it is very essential to identify the factors that stimulate the women to utilise public health facilities for maternity care.

Factors influencing the utilisation of public health services for maternal care: The present study used binary probit regression analysis to identify the factors that influence the utilisation of public health services for maternal care. Both household and individual characteristics such as household size, social groups, religion, gender of the head of the household, average years of schooling, age & employment status of women and expenditure for maternity care are included in the models.

Table 1 illustrates the binary probit regression results. The results reveal that most socio-economic variables are significantly associated with the binary dependent variable. In maternal health care, the expenditure of the household has a significant contribution in determining where to take such services. In this context, the result shows that the probability of utilisation of public health services for prenatal and postnatal care has decreased by 0.898 and 0.943 times respectively with the increment of share of expenditure for maternal care in total expenditure of the households. This ultimately enables the women to utilise private healthcare services more. Thus, as the expenditure on maternal care is getting higher, more women would prefer to use private health services.

To understand how the choice of public health services is being affected by the employment status of pregnant women, the results show that the probability of utilisation of public health services for pre-natal and post-natal care decreases by 0.934 and 0.929 times respectively if the women contain any employment status as compared to the reference category. This suggests that employed women have preferred to utilise private health

services for both prenatal and postnatal care exclusively. It is a fact that economic independence is very significant in the context of family structure in India. This economic independence tends the women to utilise expensive private health services for their maternal care. Another attempt has been made to identify how educational qualification impacted the households to utilise public health units, the study found that the probability of utilisation of public health services for prenatal and postnatal care decreases by 0.997 and 0.997 times if the household of pregnant women contains decent educational qualifications. This result illustrates that the education of the household of concerned women has played an important role in increasing awareness of maternal health, which encourages them to take private health services for prenatal and postnatal care during pregnancy. Thus, the employment status of the women coupled with a better education in the household would increase the utilisation of private health services in the country. Contrariwise, the awareness of the family regarding maternal health care is higher among educated and wealthier families; hence, it is expected that the family's education has a significant contribution to maternal health. Moreover, it is also a fact that in India most families are living jointly with their parents and siblings, hence it is impossible to deny the role of the head of the family in determining the various health-related issues within the family. The result reveals that the probability of utilisation of public health services for prenatal and postnatal care decreases by 0.966 and 0.997 times of the woman who belongs to female-headed households suggesting that female-headed households also prefer private healthcare units for the reproductive health of their women. Therefore, the role of the household head is very crucial in selecting the health care units available to them.

Explanatory variables	Dependent Variable: Whether the pregnant women have taken prenatal care from public health care unit		Dependent Variable: Whether the new born mothers have taken postnatal care from public health care unit	
Parameter	Coefficient	EXP(β)	Coefficient	EXP(β)
(Intercept)	-0.308 (0.0498)**	0.735	-0.068 (0.0506)	0.934
Whether pregnant women belong to rural sector	0.576 (0.0162)**	1.778	0.49 (0.0164)**	1.632
Whether pregnant women belong to minority community	0.086 (0.0174)**	1.089	0.063 (0.0175)**	1.065
Whether pregnant women belong to vulnerable category of SC, ST	0.524 (0.017)**	1.689	0.448 (0.0168)**	1.565
Ages between 15-20 (reference category)	0a	1	0a	1
Ages between 21-35	0.006	1.006	-0.025 (0.0311)	0.975

	(0.0303)			
Ages between 36-45	0.222 (0.0608)**	1.249	0.196 (0.061)**	1.217
Age square	0.0001 (3.96E-05)**	1	0.00019 (3.97E-05)**	1
Gender of head of the household (Female)	-0.035 (0.026)	0.966	-0.004 (0.0264)	0.996
Average years of education of the HH	-0.003 (0.0022)	0.997	-0.003 (0.0022)	0.997
Whether Pregnant women have employment status	-0.069 (0.0249)**	0.934	-0.073 (0.0253)**	0.929
Ln (HH size)	-0.013 (0.0195)	0.987	-0.082 (0.02)**	0.921
Ln (share of expenditure for prenatal care in annual consumption expenditure of the household)	-0.107 (0.0041)**	0.898	-	-
Ln (share of expenditure for postnatal care in annual consumption expenditure of the household)	-	-	-0.059 (0.0032)**	0.943
Log likelihood	-18848.18		-18865.09	
LR chi2(11)	3413.62		2272.24	
Prob > chi2	0.0000		0.0000	
Pearson chi2	31680.51		29173.16	
Prob > chi2	0.8459		0.6393	
Number of observations	32151		29739	

Table 1: Result of Binary Probit regression: Determinants of the utilisation of public health services for maternal care

Figure in parentheses indicates standard error
** indicates 1% level of significant
Source: 75th round NSSO unit level data (2017-18) of health expenditure

Many researchers argue that the utilisation of maternal health care in India varies according to the socio-economic status of the households although the country witnessed less utilisation of public health services. Conversely, certain proportions of households have a keen interest in qualitative health services and, hence visit private healthcare units. On the other hand, many families consider women's reproductive health as a matter of urgency and would never hesitate to choose public healthcare. Hence, available infrastructure plays a crucial role in selecting different healthcare units for maternal health. The result indicates that the probability of utilisation of public health services for prenatal and postnatal care

increases by 1.778 and 1.632 times for those pregnant women who reside in rural areas as compared to the reference category of urban areas. This reveals that the women of the rural sector have preferred to utilise public health services for maternal care as compared to urban areas despite the fact of persisting rural-urban differential in the economy. The urban area is the most advanced area of the country where all the modern amenities are present. Public hospitals along with several private hospitals and nursing homes are available in the urban areas, while in rural areas still now the Dais' and/or quack doctors take responsibility for the delivery of a newborn child. In this context, they prefer to visit public health centres for maternity care.

To understand how the utilisation of public healthcare units is being affected by the age of the pregnant women, the study found that the utilisation of public healthcare units for both pre and post-natal care are significantly associated if the pregnancy appeared to the women at the higher age of 36-45 years as compared to the reference category of 15-20 years. This implies that if the pregnancy appeared at higher ages, most women would prefer to utilise the public healthcare units for their maternity care, otherwise they like to visit the private hospitals. In addition, if the pregnancy appears at the age of 21-35 years, the results show a positive association between the utilisation of public healthcare units for prenatal care whereas a different result is found between the utilisation of public healthcare units for post-natal care as compared to the reference category of 15-20 years. However, both these results are statistically insignificant implying that the utilisation of public healthcare units is not affected by the age of the women. Another attempt has been made to identify the impact of household size on the choice of health services for maternal care. The study illustrates that the probability of utilisation of public healthcare units for prenatal has decreased by 0.987 times if the household size of the women is large. Almost similar results appeared in the case of post-natal care also. The plausible reason lies in the fact that higher members in the household might encourage women to seek maternity care at private hospitals.

An attempt is also made to assess the impact of ethnic groups and religions on the choice of health services for maternal care, the study found that the probability of utilisation of public health services for prenatal and postnatal care increases by 1.089 and 1.065 times respectively if the pregnant women belong to minority communities as compared to the reference category of the Hindu women. In a similar context, the probability of utilisation of public health services for prenatal and postnatal care increases by 1.689 and 1.656 times respectively if the pregnant women belong to the vulnerable categories of SC/ST as compared to the reference category of non-vulnerable category. Hence in both cases, the women have preferred to use the public health services more decisively. It is well known that the minority communities as well as vulnerable categories of SC/ST are the most deprived in the country, their low income forced them to utilise public health services for maternity care. Nonetheless, it is a fact that people of the country still follow various superstitious as well as custom-bound prejudices of the family. Hence, many families of these categories delayed them to take medical services during pregnancy. This is also one of the reasons for the less utilisation of public health services for maternity care. Thus, there

are so many factors that are responsible for the utilisation of public health services for maternity care in the country.

Summary and Concluding Remarks: The present study has attempted to explore the scenario of utilisation of public health services for maternal care in India. The study reveals a clear division between poor and wealthy states for utilising public health services for maternity health care. The low-income states lag behind the high-income states due to lack of health infrastructure, shortage of medical professionals. The low literacy and low awareness among the people of the backward states poses a big challenge in the utilisation of maternity care. As a result, people in wealthier states tend to seek private healthcare options, while pregnant women in low-income states are more likely to rely on public health services due to a lack of other alternatives. To determine the factors that influenced the women to utilise different healthcare units for maternal care, the study reveals that individual characteristics such as age and employment status have shown significant association with the maternity care. However, the study also indicates that the people of lower strata mainly belonging to the rural sector, minority community or vulnerable category have preferred public health services for maternal care as compared to urban people or other non-minority or non-vulnerable category of the nation.

Hence, a certain percentage of women have moved to expensive private healthcare units, even though public healthcare units play a significant role in delivering medical services in the country. Therefore, Govt. should undertake some initiatives in promoting quality healthcare services that can attract most women in the country, otherwise private sectors would substitute the public healthcare units. Side by side Govt. should promote rural health centres by providing sufficient medical professionals, that can encourage rural women to utilise public healthcare units broadly. In this context, the PPP (Public-Private Partnership) model could help in a long way in improving the quality of public healthcare units.

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