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Impact of Janani Suraksha Yojana on Reproductive and Child Healthcare: A Logistic Regression Analysis

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***Abstract* - The Percentage of women giving birth in healthcare facilities has drastically gone up in India after the inception of the maternity benefit program, Janani Suraksha Yojana (JSY) in 2005. The programme was introduced to incentivise the underserved women who have poor access to maternal healthcare and who bore the brunt of maternal deaths. To examine the level of awareness among women about JSY scheme, To assess the impact of JSY financial assistance on antenatal care (ANC), govt. institutional deliveries, postnatal care (PNC), and child immunization and to examine the trends in institutional and home deliveries. Study was carried out in district Kulgam of Jammu and Kashmir with a sample size of 150 respondents who had delivered from 2014-17. The study used purposive stratified cum random sampling technique. The study used both primary and secondary data sources for analysis. The primary data was collected by means of a well-designed semi structured questionnaire. The secondary data was retrieved from the Health Management and Information System (HMIS) online portal. High awareness to the extent of 78% among women was recorded in the study area. Age showed a positive significant association with awareness about JSY scheme. JSY financial assistance has a highly positive impact on the probability of full ANC reception. It was observed that in govt. healthcare institutions, 59% deliveries were normal and 41% were Caesarean Section while as in private healthcare institutions, 99% deliveries were Caesarean section and only 1% was normal. Moreover, the expenditure on delivery in private healthcare institutions was almost 6 times higher than in govt. healthcare institutions.**
***Keywords:* Janani Suraksha Yojana (JSY), Antenatal Care (ANC), Postnatal Care (PNC), Awareness, Binary Logistic Regression**

I. INTRODUCTION

Human capital as characterised by good education and good health is an important determinant of economic growth (Thoker, 2011). Health is now considered to be the most important component of social service sector having a direct correlation with the welfare of the people. Among the 17 Sustainable Development Goals, health occupies a predominant position at the 3rd place. Health is the fundamental human right and essential for individual well-being at micro level, and indispensable prerequisite for economic growth and development in a country/state at the macro level. India's record in the specific field of public health is particularly miserable, which refers to activities such as epidemiological surveillance, immunisation, waste management, water supply, sanitation etc. The basic character of India's healthcare system (highly privatised and very ineffective) has not changed in the last twenty-five years. Expenditure on health in India has almost stagnated at around 1 per cent of GDP for the last twenty-five years – a lower ration than almost anywhere else in the world. The bulk of health expenditure consists of out-of-pocket (OOP) private expenditure, and the provision of health services is also largely private, as well as profit- oriented (Dreze, 2017).

II. JANANI SURAKSHA YOJANA (JSY)

One of the main challenges for global health is to identify policies and strategies that improve the health of women and children (United Nations, 2010). Research indicates that if women have access to the essential and basic health services, about 80 percent of maternal deaths could be prevented (UNICEF, 2008). As far as perinatal and neonatal deaths in India are concerned, India has the highest single share in the neonatal deaths worldwide- around 30 percent of the neonatal deaths in the world (Gaur, 2015). In India, Maternal and Child healthcare forms the top priority. "In April 2005, in response to the slow and varied progress in the improvement of maternal and neonatal health, the Government of India launched Janani Suraksha Yojana (JSY) - a national conditional cash transfer scheme, to incentivise women of low socioeconomic status to give birth in a government health facility"(Lim *et al.,* 2010). It provides financial assistance to women who give birth in a public health facility (Ministry of Health and Family Welfare, 2006). JSY is a maternity benefit scheme introduced with an aim to decrease maternal mortality by way of promoting institutional deliveries. The JSY program identifies Indian states as low-performing and high-performing, varying the amount of cash assistance to provide higher priority incentives. In particular, 1400 rupees in rural areas and 1000 rupees in urban areas are offered to women in low-performing states, and 700 rupees in rural areas and 600 rupees in urban areas are given in high-performing states (Bonu *et al.,* 2009).Under the Janani Suraksha Yojana (JSY), the target was to ensure 100% institutional deliveries by 2010 but in several states a majority of pregnant women who were registered under JSY but finally did not use the government health centres for their delivery. Not only that, non-payment, delays in payments and irregularities marked the cash incentive programme under the scheme.

As far as the performance of JSY in Jammu and Kashmir is concerned, Infant Mortality Rate has decreased drastically form 45 in 2005-06 to 28 in 2015-16, Under Five Mortality Rate has declined form 51 in 2005-06 to 28 in 2015-16. Neonatal Mortality has declined from 26 in 2014 to 20 in 2015. Moreover Total Fertility Rate has dipped from 1.7 to 1.6 in 2016-17. Institutional deliveries have increased considerably from 86.91% in 2012-13 to 93.24 in 2017-18(J&K Economic Survey, 2017). As per NFHS-4 (2015-16) report, mother and child health indicators in the state have improved during year 2016-17 and are relatively better than the national average. In addition, the report shows that only 26.8% mothers have received full antenatal care (ANC, Full ANC means that the pregnant woman has received at least four ANC visits, 100 IFA tablets, and 2 TT injections).

The report also found 78.1% institutional deliveries but only 54% mothers have received financial assistance under JSY for institutional delivery. This indicates poor cash-benefit transfer mechanism in the state. As far as the immunisation is conerned, full child immunisation in the state has also increased from 66.7% in 2005-06 to 75.1% in 2015-16, National Family Health Survey (NFHS-4 2015-16).

III. METHODOLOGY

A. The Data

The study was carried out in district Kulgam of Jammu and Kashmir with a sample size of 150 respondents. Both primary and secondary data sources were used for analysis. Primary data was collected by means of a well-designed semi-structured structured questionnaire. The sample of the study constituted those women who had recently delivered from 2014-17. The present study used purposive stratified cum random sampling technique for data collection. Secondary data regarding the trends in institutional deliveries was retrieved from the Health Management and Information System (HMIS) online portal of Ministry of Health and Family Welfare, Government of India.

B. Logistic Regression Models

For Impact Analysis, Binary logistic regression was used. To assess the impact of JSY financial assistance on antenatal care (ANC), govt. institutional deliveries, postnatal care (PNC), and Child Immunisation, four binary logistic regression equations were run separately in which full ANC (Model 1), govt. institutional deliveries (Model 2), PNC (Model 3) and Full Immunisation (Model 4) were taken as binary dependent variables respectively. The dependent variables in all the four models were explained by 5 explanatory variables viz. age, education, economic status, family size and JSY financial assistance.

The binary logistic modeling general is expressed as:

Logit (p) = $\ln\left(\frac{P_i}{1-P_i}\right) = \beta_0 + \beta_1$ age + β_2 education + β_3 economics status + β_4 family size + β_5 financial assistance.

Age, education and family size are continuous.
Economic status is a categorical variable.
Financial assistance is a dichotomous variable assuming value either 0 or 1; 0 if financial assistance not received and 1 if received.

IV. RESULTS

The level of awareness is a principal determinant in analysing the effectiveness and coverage of a particular scheme. In fact higher awareness about the domain of a scheme leads to higher coverage of its benefits. Table I summarises the information regarding the awareness of women respondents about JSY scheme.78% respondents were aware about JSY scheme. As far as the level of awareness is concerned, about 73% of the respondents had heard about all the components of the JSY scheme, approximately 18% of the respondents had awareness only about the financial assistance component of the scheme and approximately 9% respondents had awareness about only two components viz. financial assistance and free institutional delivery. Thus we can infer that the level of awareness among women in the particular district is high.

TABLE I AWARENESS ABOUT JSY SCHEME

Awareness about JSY	**Frequency**
No Awareness	33 (22.00)
Awareness	117 (78.00)
Level of Awareness (n=117)	
All Components*	85 (72.65)
Financial Assistance	21 (17.95)
Financial assistance and free institutional delivery	11 (9.40)
Source of awareness (n=117)	
Doctor	0 (0)
ANM/AWW	21 (17.95)
ASHA	94 (80.34)
Govt. publicity/Electronic/Print Media	2 (1.71)

*All components include free institutional delivery, financial assistance, antenatal care (ANC), post-natal care (PNC), free transport, and free medicine

A. Logistic Regression Parameter Estimates

Null Hypothesis: All the slope coefficients of the explanatory variables are equal to zero. i.e. $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$

Table II presents the parameter estimates of the first binary logistic regression model. The coefficients of age and family size were statistically significant at 5% level. The odds ratio for the age variable indicates that there exists a negative relationship between the age of the respondent and the probability of receiving full ANC. That means if the age of the respondent increases by one year, the probability that the woman will receive full ANC decreases approximately by 12% holding the other explanatory variables constant. This is because when the age of a woman increases, it is less likely that she will go for more and more ANC check-ups.

TABLE II LOGISTIC REGRESSION PARAMETER ESTIMATES

Model 1 – Impact of JSY financial assistance on Full ANC						
	B	**S. E$_\beta$**	**Wald**	**df**	**Sig.**	**Exp(β)**
Age	-0.129	0.060	4.670	1	0.031*	0.879
Education	-0.027	0.038	0.526	1	0.468	0.973
Economic Status	0.409	0.497	0.676	1	0.411	1.505
Family Size	0.147	0.068	4.675	1	0.031*	1.158
Financial assistance	1.877	0.527	12.670	1	0.000**	6.533
Constant	1.082	1.983	0.298	1	0.585	2.950
*α=0.05 ** α=0.01 Model χ^2 = 32.928 df = 5 p-value = 0.000 -2log likelihood = 156.610 Cox and Snell R-Square = 0.197 Nagelkarke R-Square = 0.275						

Similarly the odds ratio for family size indicates a positive relationship between the family size and the probability of receiving full ANC which means that if the family size increases by 1 member, the probability that the respondent will receive full ANC increases approximately by 15.8% keeping the other explanatory variables constant. This is because as family size increases, there are more family members to attend the pregnant woman while receiving ANC Check-ups and other ANC components. The odds ratio of financial assistance was highly significant at 1% level and it indicates that there exists a strong positive relationship between financial assistance and the probability of receiving full ANC keeping other independent variables constant. This means that the woman who has received the financial assistance has 6.5 times higher chances of receiving full ANC than the woman who has not received. The coefficients of education and economic status were found statistically insignificant. Therefore this implies that education and economic status do not have a statistically significant impact on the probability of receiving full ANC.

TABLE III IMPACT OF JSY FINANCIAL ASSISTANCE ON GOVT. INSTITUTIONAL DELIVERIES

	β	**S. E$_\beta$**	**Wald**	**df**	**Sig.**	**Exp(β)**
Age	-0.254	0.132	3.696	1	0.055**	0.776
Education	-0.098	0.072	1.826	1	0.025*	0.907
Economic Status	2.352	2.021	1.354	1	0.245	10.503
Family Size	0.320	0.163	3.853	1	0.050*	1.377
Financial assistance	8.358	2.448	4.657	1	0.001***	611.890
Constant	1.471	4.444	0.110	1	0.741	4.354
*α=0.05 ** α=0.10 *** α=0.01 Model χ^2 = 157.654 df = 5 p-value = 0.000 -2log likelihood = 50.291 Cox and Snell R-Square = 0.650 Nagelkarke R-Square = 0.867						

From Table III, The odds ratio of age it indicated a negative relationship between age of the respondent and the probability of delivery of a woman in a Govt. health institution and more precisely it implies that if the age of the respondent increases by one year, the probability that she will have a Govt. institutional delivery will decrease approximately by 23% keeping the other independent variables constant. The odds ratio of education variable also indicates a negative relationship between education and the probability of delivery of a woman in a Govt. health institution which means that if the education of the woman respondent increases by one year, the probability of her delivery in a Govt. health institution decrease approximately by 10% holding the other explanatory variables constant. This is because as their level of education increases, they find it better and safer to give birth in a private health institution rather than in a govt. health institution. It is possibly due to the fact that their perception tilts favourably towards the private health institution regarding the quality of health services they provide. The second possible reason for this is due to the fact that education and income have a direct relationship and thus as the level of education of a woman increases, her level of income increases and thus her affordability for availing private healthcare facilities also increases. The odds ratio of family size showed a positive relationship between the family size of a woman respondent and the probability of her delivery in a Govt. health facility. This means that if the family size of the woman respondent increases by 1 member, the probability that the woman respondent will deliver in a Govt. health institution increases approximately by 37% holding other predictors constant. The odds ratio of financial assistance shows a very high positive deterministic relationship between receipt of financial assistance and the probability of delivery of a woman in a Govt. health institution which more precisely means that those women who receive cash assistance under JSY have 611% higher chances of delivering in a Govt. Health facility than those who have not received it keeping other explanatory variables constant. This is due to the fact that cash assistance is only provided to those women who give birth in Govt. health facility and not to those women who give birth in a private health institution. The coefficient of economic status is statistically insignificant which showed that economic status is not having any impact on the probability of woman delivering in a Govt. health facility.

From Table IV, the odds ratio of education variable implies a positive relationship between the level of education of the women and the probability of receiving postnatal care. More appropriately it means that if the level of education of women increases by 1 year, the probability of receiving postnatal care increases approximately by 12%, keeping other variables constant. This is due to the fact that as the level of education of women increases, they become more and more aware about the need and importance of postnatal care after delivery. The odds ratio of economics status implies that as the economic status of women improves they are more likely to receive postnatal care (APL as reference

category). More specifically, the women who have APL economic status are 2.18 times more likely to receive the postnatal care services than the women who have BPL economic status.

TABLE IV IMPACT OF JSY FINANCIAL ASSISTANCE ON POSTNATAL CARE

	β	$S.E_\beta$	Wald	df	Sig.	Exp(β)
Age	0.060	0.055	1.165	1	0.280	1.061
Education	0.114	0.039	8.738	1	0.003*	1.121
Economic Status	0.781	0.472	2.734	1	0.098**	2.184
Family Size	0.073	0.063	1.326	1	0.249	1.075
Financial assistance	-0.264	0.511	0.267	1	0.605	0.768
Constant	-3.030	1.923	2.481	1	0.115	0.048

* α=0.01
** α=0.10
Model χ^2 = 32.329 df = 5 p-value = 0.000
-2log likelihood = 158.626
Cox and Snell R-Square = 0.194
Nagelkarke R-Square = 0.269

TABLE V IMPACT OF JSY FINANCIAL ASSISTANCE ON FULL IMMUNISATION

	B	$S.E_\beta$	Wald	df	Sig.	Exp(β)
Age	-0.150	0.103	2.149	1	0.143	0.860
Education	0.053	0.073	0.528	1	0.073*	1.055
Economic Status	-0.067	0.915	0.005	1	0.942	0.935
Family Size	0.272	0.200	1.841	1	0.175	1.312
Financial assistance	-1.863	1.316	2.004	1	0.157	0.155
Constant	6.590	3.797	3.011	1	0.083	727.551

*α=0.10
Model χ^2 = 14.241df = 5 p-value = 0.000
-2log likelihood = 53.849
Cox and Snell R-Square = 0.091
Nagelkarke R-Square = 0.248

From Table V, the odds ratio of the education variable implies a positive relationship between the level of education and the probability of full immunisation received by the new-born child. More appropriately it can be said that if the level of education of women increases by 1 year, the probability that their children will be fully immunised increases approximately by 5%. This is possibly due to the fact that as the level of education of women increases, they understand the importance of child immunisation in eliminating various dreadful diseases and hence they ensure full immunisation of their children. The slope coefficients of other explanatory variables were found statistically insignificant and thus it can be concluded that they do not have any impact on the probability of full child immunisation. The reason behind this is that the immunization network is such that age of the mother, her economic status, family size and receipt of cash assistance are immaterial in determining the probability of full child immunisation.

TABLE VI TYPE OF DELIVERY

	Type of delivery	Frequency (Percentage)
Govt. Healthcare Institutions (n=75)	Normal	44 (58.70)
	Caesarean section	31 (41.30)
Private Healthcare Institutions (n=75)	Normal	1 (1.30)
	Caesarean section	74 (98.70)

From Table VI it is apparent that in Govt. healthcare institutions, almost 59% deliveries were normal and 41% deliveries were of caesarean section type. But if we take the case of Private healthcare institutions, almost 99% deliveries were of caesarean section type and only 1% deliveries were normal. This is due to the fact that private healthcare institutions aim at profit maximisation and by doing caesarean section operations at a higher concentration they are in position to grab more and more money from the public without bothering about the feasibility of caesarean section births and welfare of the masses. The relative share of deliveries in private health centres has increased over the years and the costs which are associated with the deliveries are often appalling for the poor. Though research in this field has identified socio-economic, demographic and geographic obstacles in the utilization of maternal care, little is known on the cost differentials in delivery care in India. Table VII summarises the Out of Pocket (OoP) expenditure incurred by the sampled respondents on delivery.

TABLE VII OUT OF POCKET (OOP) EXPENDITURE ON DELIVERY

Govt. institutional delivery (in □)				Private institutional delivery (in □)			
Min	Max	Mean	S.D	Min	Max	Mean	S.D
1000	15000	5173.33	3174.533	20000	38000	29706.67	4876.234

The mean expenditure of the women who delivered in a govt. health institution was approximately equal to□ 5173 and the mean expenditure of the respondents who delivered in a private health institution was approximately □29707. The minimum and maximum expenditure on delivery in govt. hospitals was □1000 and □ 15000 respectively. But in case of private hospitals, the minimum expenditure was □20000 and maximum expenditure was □38000 i.e., the mean expenditure on delivery in private hospitals is almost 6 times higher than the delivery expenditure in govt. hospitals. More precisely it can be said that women who give birth in a govt. healthcare institution spend on an average□ 24534 lesser on delivery care than those who give birth in a private healthcare institution which is significantly higher than the amount of JSY cash assistance provided in rural areas. This huge disparity in private and govt. hospital expenditures on delivery is due to the fact that in private hospitals, the concentration of caesarean section births is

much higher than in govt. hospitals and in addition due to the higher fees charged in private healthcare institutions as compared to govt. healthcare institutions.

V. POLICY RECOMMENDATIONS

1. The OoP expenditure in public health centres has declined over time, possibly due to increased spending under the National Rural Health Mission. On the basis of these findings, it is recommend that facilities in public health centres should be improved and public–private partnership models should be established to reduce the economic burden of maternal care on poor masses.
2. The cash incentives under the JSY programme should continue as these incentives have been successful in increasing the institutional deliveries and reducing the expenditure on delivery care in public health centres.
3. Despite higher delivery expenditure in private healthcare centres, deliveries at private healthcare centres are likely to increase in coming years. It is difficult for the poor to afford these services, particularly complicated caesarean section deliveries. Hence we suggest that the amount of cash assistance under the JSY scheme should be increased, and the cost of delivery in private health institutions is regulated so as to reduce the economic burden on poor.
4. JSY is not about increasing institutional deliveries only. Programme aims at reducing maternal and child mortality which will be achieved when women receive quality delivery and post-partum care services in public health centres. Therefore supply-side inadequacies in various forms, including skilled manpower, medicines and supplies need to be urgently addressed.
5. Pregnant women lack awareness about the importance of Iron and Folic Acid tablets during pregnancy period. Therefore, awareness initiatives regarding the importance of Iron and Folic Acid tablets should be taken by the govt. to meet the requirements of underserved women.
6. The study shows that only 1.71% respondents have heard about JSY Scheme from Govt. publicity/Electronic media/Print media. This means that electronic and print media is not contributing much in making the pregnant women aware about the scheme. Therefore, government should take initiatives for making people aware about JSY scheme through media.
7. Caesarean section births require more expenses in terms of additional costs on medicines, surgical items and a longer stay in the hospital, and the JSY cash assistance falls short of meeting such expenses, therefore we recommend that the amount of cash assistance for such cases should be increased.

VI. CONCLUSION

78 percent awareness was recorded in the said district but less than 2 percent women had heard about JSY through electronic/print media or govt. publicity. Therefore, the need of an hour is to make women more and more through govt. publicity and awareness programmes at village and block level so that they can better utilise the benefits of JSY scheme. Moreover, targeting remote areas with special measures and emphasis on more and more antenatal care check-ups are the essential prerequisites to improve the effectiveness of the scheme. The interesting finding of the study is that 99% deliveries in private healthcare institutions were caesarean section type. Another important finding of the study is that mean expenditure for delivery in private health institution is almost 6 times higher than that of a govt. health institution. This is a matter of concern and it is incumbent upon government to regulate and monitor the private healthcare institutions properly. The study results show that there is a positive relationship between the level of education and the probability of full immunisation received by the new-born child. This study attributed this positive relationship to the fact that as the level of education of a mother increases, she becomes increasingly aware about the importance of child immunisation and thus ensures full child immunisation. Besides government expenditure on health is a small percentage of the total public spending and such proportion of the expenditure is insufficient to address the health needs of the masses in general and underserved people in particular. There is a need not only for better healthcare delivery, through institutional change, but also for devoting much more resources, as a proportion of the GDP, to public expenditure on health. This has to go hand in hand with the cultivation of greater efficiency and accountability in public services.

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