

Cesarean Births: The Indian Scenario

Chayan Roy Choudhury*

Background of the Study

In today's situation when the access to obstetric care is growing day by day there has been a concern over the rising caesarean rates over the world. Caesarean section is the surgical intervention in case of serious delivery complications. This surgical procedure has been saving lives for a long period of time. The concern for the caesarean rates is due to its rapid increase over the period. The WHO published guidelines regarding caesarean rates in 1985 which was revised in 1994. The guidelines states that the proportion of caesarean births should range between five and fifteen per cent. It is mentioned in the guidelines that no additional benefits accrues to the perinates or the mothers when the rate exceeds the level. If we take this as our guideline the scenario of the caesarean rate over the world is quite alarming. Both the developed and the developing countries are not showing a satisfactory mark for the rates. The level of caesarean section (CS) is well above the WHO (1985) mentioned fifteen per cent mark for many of the countries, and it is increasing over the time. In U.S. the rate was 22.7 per cent in 1990, which increased to 27.5 per cent in 2003. These levels and trends of CS rates are even higher in case of Latin America; it ranged from 16.8 per cent to as high as 40 per cent in the countries of this region. It has been established that there are over 850,000 unnecessary CS performed in the region each year. Higher rates were observed in private hospitals than in the public ones (Belizan et.al. 1999). The estimate for the CS rates in East Asia also shows that it is well above the 15 per cent mark (Stanton, 2006).

India is also not excluded from this trend. Though the estimates of CS rates in India is 7.1 per cent in the year 1998 and there is 16.7 per cent change in the rates annually in India (Stanton, 2006), which is one of the highest among the countries. Though the constraint of data has masked the actual rates, but still the pace of change is very high. A five-year audit from a large teaching hospital in Kolkata showed a caesarean section rate of 49.9 per cent (Pahari, et.al. 1997) and another study in Madras showed an alarming caesarean section rate of 50 per cent (Sreevidya, 2003). When controlled for demographic variables, the odds for caesarean section were about 1.7 times more likely to occur in private health institutions in Kerala (Padmadass. et al, 2000)

* Research Scholar, International Institute for Population Sciences, Mumbai-88.

The factors associated with caesarean section are age, parity, multiple pregnancy, maternal weight gain, and birth weight. Including these factors the caesarean section is justified under certain circumstances such as cephalo pelvic disproportion and contracted pelvis, dystocia due to soft parts, inadequate uterine forces, antepartum hemorrhage, pre eclamptic toxemia, eclampsia, fetal distress and prolapse of the cord, malpresentation, maternal distresses such as heart problems, bad obstetric history, habitual intrauterine death of the fetus and elderly primigravida. Except these demographic and medical reasons the patient request and the physician factor are playing a major role in increasing caesarean section rates. As caesarean section is less painful and less time consuming the patients request the obstetricians to perform the caesarean and in case of the physicians it is also much more convenient and quick than attending a normal vaginal delivery (Pai, 2000). In India giving birth in an auspicious day are driving the women to go for a caesarean section (Mishra, 2002).

Though the consensus between the economic profits of physicians and performing a caesarean section is known it is still to be established with relevant data. But the increasing rates of caesarean section in the private sectors indicate this nexus (Sreevidya 2003, Mishra 2006).

If there is less accessibility of the emergency obstetric care then that could be reflected in rates of CS, which in turn will suggest high risk of maternal morbidity and deaths, foetal deaths and poor health condition. The high rate of caesarean section does not always suggest that there is a good health care utilization; rather it may suggest malpractice of the technique, which indirectly relates to the unnecessary maternal morbidity. In India the situation is little different. A large proportion of deliveries take place at home. So in large proportion of cases, though CS is required women cannot get it due to lack of essential facilities. The rural areas in most parts of India do not have facility for conducting even a normal delivery. According to the India Facility Survey conducted by IIPS, essential emergency obstetric care kit was received by only one third of the surveyed PHC's. In India where still there is less accessibility of the emergency obstetric care in the rural sector, the situation could be very different from that of the urban sectors. The women having a delivery complication in the rural sector usually turns up into the places where the facilities are less and virtually they are forced to go for normal delivery because of the absence of the equipments to perform a caesarean section. The delivery complications, which can be handled efficiently if known from the beginning, are many times over looked and when the situation becomes critical women are taken to the urban health posts for treatment, and many

times it happens that the doctors have no other option except to go for caesarean section. This is a vital reason for which the caesarean section is more in some of urban centers of India.

DHS data showed that in developing countries, one in eight births were delivered by caesarean section, which accumulated to nearly about 14 million surgeries. It is also found that the urban rates are three times higher than the rural rates. Further analysis revealed that India has one of the highest rates of change in Caesarean Section (Stanton, 2006).

A population based cross sectional study in Madras (Sreevidya S et.al, 2003) concluded that high percent of births by caesarean section in the private sector is alarming and could implicate private sector care as the main contributing factor behind the high population caesarean section rates. A health facility-based study was carried out in 2002 in four districts of West Bengal, India. It is established by Biswas et.al (2005) that the numbers of basic and comprehensive EmOC facilities were inadequate in all the four districts compared to the minimum acceptable level. The rate of caesarean section calculated for all expected births in the population varied from 3.5 percent to 4.4 percent in the four districts with an overall rate of 4 percent, which is less than the minimum target of 5 percent.

The rise in the caesarean section over the period and especially in some of the places is still unexplained because of the problem of proper data. The attempt with the NFHS – I data (Mishra, 2002) gave the past cesarean birth rates. After that there has been no attempt to estimate the current scenario and the trend of the caesarean section rate over the years for India. The concern for the high caesarean rates in some of the regions of India is expressed, but the present facts about these places are yet to be explored. The previous studies pointed out that the occurrence of caesarean births is dependent upon many background factors such as age, parity, economic status, place of residence. The effects of these factors upon caesarean births are estimated in most of the studies done earlier but there is a need to know the present importance of these factors.

The WHO guidelines of caesarean rates are fixed at five to fifteen percent. However, this situation of overburdened caesarean rates needs special attention. The scenario of the states with respect to the CS and the complications that are responsible for the caesarean section is a matter that has to be given some insight into.

In India where the safe delivery is 47.6 percent (RCH-II), the emergency obstetric care provided to the patients is not uniform over the geographical spread. It is different for urban and rural regions and it is even different for different states of India. The providence of the emergency obstetric care and its efficiency results into the health of the concerned women and her baby.

Based on all the above mentioned discussions, the broad objective of this study is to estimate the rates of Caesarean Section births in India and across the states and to examine the factors associated with CS births. The specific objectives for this study are as follows:

1. To estimate the levels of births by C-section in India and its States.
2. To study the differentials in CS rates across the States, place of residence and place of birth.
3. To study demographic and socio-economic maternal factors associated with CS births.

DLHS (RCH) – II dataset has been analyzed for the purpose of this study. Though it is obvious that cesarean section is an institutional procedure, the analysis is done on “all births” and “institutional births”. The presences of the home deliveries for “all births” reduce the rates of cesarean section but it is important to know the levels of cesarean births among all births. The analysis has been done on the women who had their last live birth during 1999-2004.

Results

Levels and Differentials of CS births

The caesarean section rate in India among all births is 7.8 percent (Table 1) whereas the rate of c-section is 18.6 percent among the institutional births. The CS rate for overall birth regarding rural region is just below the five percent mark and for the urban regions it is just above the fifteen percent mark. The concern is more for the private institutions where the caesarean rate is above 20 percent for both rural and urban areas. At the same time there is a huge gap between the rate of this surgical intervention in the public institutions and the private institutions.

It is clear from table 1 that the ‘South’ region of India has the highest caesarean section rate, which is around 17 percent. The ‘Central’ and ‘North-east’ region of India has caesarean rates below the WHO specified 5 percent mark. In India the Christians have highest caesarean rate. Among the categories of caste the women from the general category are having more caesarean section than any others. The women who have education more than secondary or are from the high SLI group have caesarean rate around 20 percent. The women in the low risk age are more in number who are having caesarean births than the

women from the high risk age group. The rate of caesarean birth for the women getting full ANC is double of the women who are getting some ANC.

The overall rate for India does not explain the prevalence of C-section among the states. The prevalence of low C-section over different regions can reduce the overall rate and vice-versa. To know the actual situation of C-section rates it is important to measure the states individually.

Majority of the states are within the WHO specified range of five to fifteen percent C-section. figure 1 shows that five states are above the range and 12 states are below the range. This rate ranged between 26 percent and 2 percent. The prevalence of c-section is generally more in the southern states where as the northern states of India are either below the five percent level or in the range of five to fifteen percent. The states, which are above the fifteen percent mark, are Kerala, Pondicherry, Goa, Tamilnadu and Andhra. Among these states Kerala has the highest percentage of c-section with 25.74 percent of all births. Pondicherry and Goa closely follow Kerala. Tamilnadu and Andhra are just above fifteen percent, with c-section rate of 17.28 and 17.03 percent respectively. Uttar Pradesh has a rate of 3.91 percent, which is least among all the states of north and central India. West Bengal is the only state in eastern India, which has a high rate of caesarean sections with 12.06 percent of all the births. The occurrence of c-section is least in Bihar (3.26 percent) among the eastern states. Bihar stands in the second least position among all the states with Nagaland having the least percentage. North-Eastern states of India are low with respect to this measure. Except Tripura (8.08 percent) and Manipur (6.64 percent) all other north-eastern states are below the range. It is also clear from the figure 1 that except Goa the states like Maharashtra (8.52 percent), Gujrat (8.83 percent), which are at the western region of India, are well inside the range of five to fifteen percent. The availability of the emergency obstetric care and the better medical facilities makes the urban region inclined to having more caesarean section than the rural areas. The analysis of the states with respect to their urban and rural regions reveals that there is a huge gap between the percentages of c-sections of the urban and rural areas of almost all the states. Though c-section rate for the total of most of the states are either below or inside 5-15 percent, the percentages with respect to the urban region is more than 5 percent for almost all the cases except Nagaland, whereas for the rural areas half of the states are below the five percent mark.

This disparity between rural and urban region is maximum in West Bengal, where the difference is about 23 points, no other major state has disparities as high as this. Assam, Jharkhand, Chattisgarh, Gujrat, Maharashtra, Karnataka, Tamil Nadu and Andhra Pradesh are

the major states, which have high inconsistency in their rural and urban rates of c-section. Considering only the urban regions, West Bengal has the highest rate of caesarean section among all the states. It is rare that the rate of a rural area crosses ten percent. Kerala, Tamil Nadu and Andhra are the only three major states, which has more than 13 percent rural c-section rate. Kerala is the only major state in India, which exceeds the WHO, specified fifteen percent mark with respect to the rural c-section rate.

The process of this surgical intervention is possible in a proper medical set-up and with expertise of the doctors, so it is obvious to have c-sections in an institution. The institutional rate of caesarean section in the states portrays the prevalence of the method in public and private institutions. Figure 3.3 shows that the caesarean section rate among the institutional births hardly goes under ten percent. Some of the states like Punjab, Chattisgarh, Jharkhand and Uttaranchal which had a low c-section rate for all births have a very high rate of c-section for the institutional births. 22 of the 35 states have institutional caesarean birth rate over fifteen percent. Andhra and Kerala have the highest institutional birth by caesarean section with a rate of 27.68 and 26.19 percent respectively.

The urban rural difference for the institutional caesarean rate is not as high as was in the case of CS rates for all births. The urban rate is double than the rural rate for the states like West Bengal and Assam. Andhra Pradesh has the highest rural CS rate of 26.60 and West Bengal has the highest CS rate of 32.50 for the urban regions. Kerala and Andhra Pradesh both have rates more than 20 percent for rural and urban areas, whereas most of the states have urban rates more than 15 percent.

The c-section rates in the institutions had been of great concern. The analysis of the c-section deliveries for the private and public institutions substantiates this concern. From table. 2 it is observed that the rate of caesarean births in the private institutions is very high and there is a noticeable gap between the rates of public institutions and the private institutions. The rate for public institutions is highest in Punjab where out of 100 births 23 are caesarean, the rate for private sector is even worse. In West Bengal 42 out 100 births are caesarean. 90 percent of the states have a rate of more than fifteen percent for the private institutions; on the other hand most of the states c-section rate for the public institutions is within the range of five to fifteen percent. It is of more importance that the rate in private barely goes under 20 percent. The situation worsens if we go for the urban private institutions. In West Bengal every second birth is by caesarean section in urban private institutions. The rate is also very high for rural private institutional deliveries. Every third birth in the rural private institutional deliveries is by caesarean in West Bengal. Deliveries by caesarean section in the

public institutions are less than that of the private institutions. Punjab, Jammu & Kashmir and Nagaland are the only three states where the rate is higher in public institutions than that of the private institutions for both urban and rural areas. The occurrence of Caesarean in the rural public institutions less and the rate is also in a controlled situation, at the same time the private institutional c-section deliveries in the rural regions are high. In spite of being much urbanized Delhi has a decent rate of caesarean section. The rates for all the categories in Rajasthan are within the WHO specified limits.

Factors associated with CS births: Results of Multivariate Analysis

It is evident from Table 3, that when controlled for all other factors region have a significant variation for caesarean births. The odds of having caesarean births in the 'South' region are 1.7 times higher than that of the 'North' region. Whereas the 'East', 'West' and 'North-East' parts have less chance of caesarean births than the 'North', among which 'West' is least in favor of caesarean delivery. The effect of the individual states in these regions may have a very high chance for caesarean birth, but the effect of the low prevalent states considered in the region could have brought down the chance. It is therefore necessary to do state level analysis.

The analysis from the logistic regression clearly shows that place of residence has a significant effect on the caesarean section. The chance of having a caesarean section increases with the change of place of residence from rural to urban. The chance of having a caesarean section for the women residing in an urban sector is 1.16 times as that of the women living in a rural area. The demographic and socio-economic conditions of the persons living in the rural and urban places affect the outcome of the caesarean births to a large extent. The availability of the medical facilities and other emergency services puts the urbanites in a better position for treatment seeking which may be the driving force behind the higher odds of having caesarean births in the urban areas.

Although the chance of having c-section is lower in Muslims and higher among Christians than that of Hindu's the chances are very close to each other and also it is significant only for Muslims. There is a less significant chance for the scheduled castes, scheduled tribes and OBC's to have a caesarean section with that of the reference category 'Others'. But the odds of the SC, ST and OBC are very close to each other which indicate that these three groups have similar characteristics regarding caesarean births.

The standard of living of the household plays an important role on the decision to have a caesarean delivery. This is validated from the results of logistic regression. The

women belonging from a medium SLI family and a high SLI family have significantly higher chance of having a caesarean delivery than those women who comes from a low SLI status. The women from high SLI status are 1.5 times more likely to have a caesarean birth than that of the women from a low SLI group. This result indicates that the affordability of the caesarean operation is an important factor.

As the education level of the women increases the knowledge about the pregnancy also increases, so it is expected that educational level will have a significant effect on the outcome of pregnancy. It is observed from the logistic analysis that as the higher educational level of a woman increases she becomes more likely to have a caesarean section. Though a woman having primary education has less chance for caesarean births than that of the non-literate women, the possibility of this surgical procedure is 1.25 times for the women having education more than secondary.

The place of delivery is one of the most important factors that affect the delivery outcome. In fact the public and private institutions have a very different characteristic in case of caesarean births. Our concern over this particular variable is validated from the results of logistic regression. The caesarean section is significantly higher in the private institutions with respect to the public institutions. The women going to private institution are 1.7 times more likely to have a caesarean birth than that of the women going to public institutions for delivery.

The increase in the birth order implies the woman is getting more experienced regarding delivery procedures and the chance of having serious complications gets reduced. The result from the regression analysis does not deviate from this fact; with the increase in the birth order the chance of caesarean delivery reduces significantly. The women with three or more birth order are 0.55 times less likely to have a caesarean than the first time mothers.

Age of the mother at childbirth is one of the most important factors in caesarean delivery. The women in the age group 18 to 35 are considered to be in the low risk of pregnancy complications, which could result into caesarean delivery. But the result from the regression analysis does not conform to our belief. According to the logistic analysis the chance of having a caesarean birth is significantly less for the women with age less than 18 or more than 35. According to the result the high-risk women are 0.87 times less likely to have a caesarean birth.

Multiple births have a significantly greater chance of being delivered by caesarean section. The odd of having a caesarean section for a multiple birth with respect to the single birth is 1.8.

Pregnancy complications if not treated carefully can result into serious problems. Thus pregnancy complication is important factor affecting normal delivery. When the pregnancy complications are considered it becomes obvious to observe the effect treatment seeking behaviour for those complications. The result shows that there is a higher significant chance of having a caesarean birth for those women who had complication and had sought treatment than the women who do not have any complication. Though the chance for caesarean is less for those who have not sought any treatment for their complications than the women with no complication the result is not significant.

Delivery complications are more important than that of the pregnancy complications because this type of complication affects the normal birth directly and there is more chance for caesarean section if a delivery complication is experienced. This assumption is well validated by the results of logistic regression. The women having at least one delivery complication are 5.7 times more likely to have a caesarean section than a woman who did not experience any delivery complication. The chances of having caesarean are even more for those who have two or more than two delivery related complications.

The effect of the programmatic variable ANC is little different from other variables. The women who had at least some ANC are 1.4 times more likely to have a caesarean section with respect to those who did not have any ANC and this effect is significant. The women who had gone for full ANC have even more chance of caesarean than the women with at least some ANC. This may be because the women who had complications had gone for ANC, and it is not because of the ANC the caesarean is more it is because the complications are more in these women, which results into caesarean birth.

Public and private institutional deliveries were separately analyzed through multivariate logistic analysis, the results thus obtained as shown in table 4. states that the type of place of residence does not have a significant effect for caesarean births occurring in the public institutions but this factor is significant for the private sector deliveries, which indicates that people coming for deliveries in the private sectors are mainly from the urban regions, this could be because generally the private institutions are situated in the urban regions and is easily accessible by the urbanites. People from the Muslim religion have a less chance of caesarean birth than the Hindu's for private institutional births. The women from higher SLI group tend to have caesarean sections more in the private sectors than the public institutions.

Table 5. shows that when controlled for all other variables the institutional factor plays a significant role in most of the states. There is a higher chance of having a caesarean

section in the private institutions than that of the public institutions except Chattisgarh, Goa, Orissa Punjab and Nagaland where the odds of having a caesarean section birth is higher in the public institutions, but this result is not significant for Chattisgarh, Nagaland and Punjab. Goa and Maharashtra are least regarding odds of having a private institutional caesarean delivery. Most of the states for which the result is significant have an odds ratio around 2 or three. Odds ratio greater than three are observed for the north-eastern states. Except the north-eastern states Andhra Pradesh, Uttaranchal and Pondicherry are the only places where the odds of having a caesarean section in the private institution is 3 times with that of the public institutions.

Discussion and Conclusion

The analysis showed that though the overall rate of caesarean section is 7.8 percent the states have significant difference regarding the measure. When the regions are considered controlling all other variables all of them except 'Central' came significant. The concern for high values of caesarean section rate revolved around the southern states like Kerala, Andhra Pradesh, and Tamil Nadu. West Bengal is the only state from the eastern part of India which has a very high caesarean rate; in fact it has the highest private institutional caesarean birth rate. The national rate for caesarean births goes well above the fifteen percent mark. The most important of all is that these rates are soaring in the private institutions. The private practice of the doctors and the financial motive of the private institutions may be playing some important role in determining the caesarean rates.

The differentials with respect to rural urban region showed that there is a large difference between the two places of residence with urban rate being higher than the rural rates. The availability of the medical facilities in the urban areas is one of the reasons for higher caesarean rate. The people from the neighbouring rural areas are highly dependent on the urban medical facilities, which make the urban areas more prevalent for caesarean births. Considering the caesarean rate among the institutional births only, the scenario becomes grimmer, because of the very high caesarean rates, in addition to this the national rate also goes beyond the fifteen percent mark. The concerns for the private institutions are more as these rates goes above thirty percent on a regular basis.

To understand the nature of the caesarean birth rate with respect to the background characteristic of women it was observed that the Christians and the women belonging to the general category have high caesarean rates. It was found that as the women get more educated the rate of caesarean also increases. Standard of living index was an important

variable in the study done; this variable showed the expected result of high caesarean rate among the higher SLI group. Higher caesarean rate in the higher SLI group conveys the message that financing the caesarean operation is a major issue.

Higher birth order showed lower caesarean rates. The risk of caesarean section gets reduced as the women became more and more experienced with the complication factors of pregnancy that leads to the surgical intervention in the delivery. It is therefore obvious that in a higher parity the women have less chance of having any complication and at the same time the chances of caesarean section is also lower.

The women in the high risk age group are having less c-section and the women in the low risk age group have higher caesarean births. This disparity of result for the age group could be because the number of women in the 18 to 35 age are more and these are the women who are giving first order births, which is making the women more vulnerable to caesarean delivery; whereas the women in the older ages are generally not the first time mothers, which reduces the risk of pregnancy complication due to their previous experience.

The relationship with caesarean birth and ANC is not to our expectation, because women having full ANC are having more caesarean. This disparity could be because those women who have more complications are going for full ANC and because of the complications these women are more vulnerable to have a caesarean birth.

Pregnancy and delivery complications are major determinants of caesarean births. When treatment seeking behaviour of the women of those women who have pregnancy complication are considered the results showed that there is higher chance of caesarean birth for the those who have sought treatment for their complications. This is contradicting to our belief, but this could be because the women who had sought treatment had severe complications which were not solved even after the treatment. Due to the constraint of the information available from the RCH – II data it was not possible to understand the outcome of the treatment given to the women. The logistic regression analysis on the pregnancy and delivery complication revealed that with or without control ‘abnormal foetal lie during pregnancy’ and ‘breech presentation during delivery are the most significant complications. The regression analysis revealed that place of residence, SLI, place of delivery, age of mother at child birth, birth-order, delivery complications and ANC have a significant effect on the caesarean section birth. It is also worth mentioning that the women who were treated for their pregnancy complications have higher chance of caesarean birth than that of the women who didn't have any complication.

Table 1. Caesarean Rates in India with respect to Background Characteristics

Variables	Categories	CS Rate
Region	India	7.8
	North	6.16
	Central	3.73
	North-East	4.08
	East	5.65
	West	9.79
	South	16.84
Place of residence	Rural	4.90
	Urban	15.61
Religion	Hindu	7.71
	Muslim	6.59
	Christian	13.56
	Others	13.15
Caste	Others	11.63
	SC	5.36
	ST	2.90
	OBC	7.78
SLI	Low	2.68
	Medium	8.81
	High	19.59
Women's education	Non-literate	2.74
	Primary	4.90
	Secondary	9.22
	> Secondary	20.74
Place of delivery	Public	12.79
	Private	23.60
Birth order	Birth order 1	13.96
	Birth order 2	9.60
	Birth order 3 and above	2.75
Age of mother at child birth	18 to 35	8.15
	<18 or >35	5.24
Multiple births	Single	7.75
	Multiple	13.23
Complication treated	No complication	6.56
	Complication treated	15.11
	Complication not treated	5.20
Delivery complications	No delivery complications	3.20
	1 delivery complication	14.63
	2 or more delivery complication	14.35
ANC	No ANC	1.07
	Some ANC	7.89
	Full ANC	14.73

Figure 1. Cesarean Section Rate for All and Institutional Births of India and the States

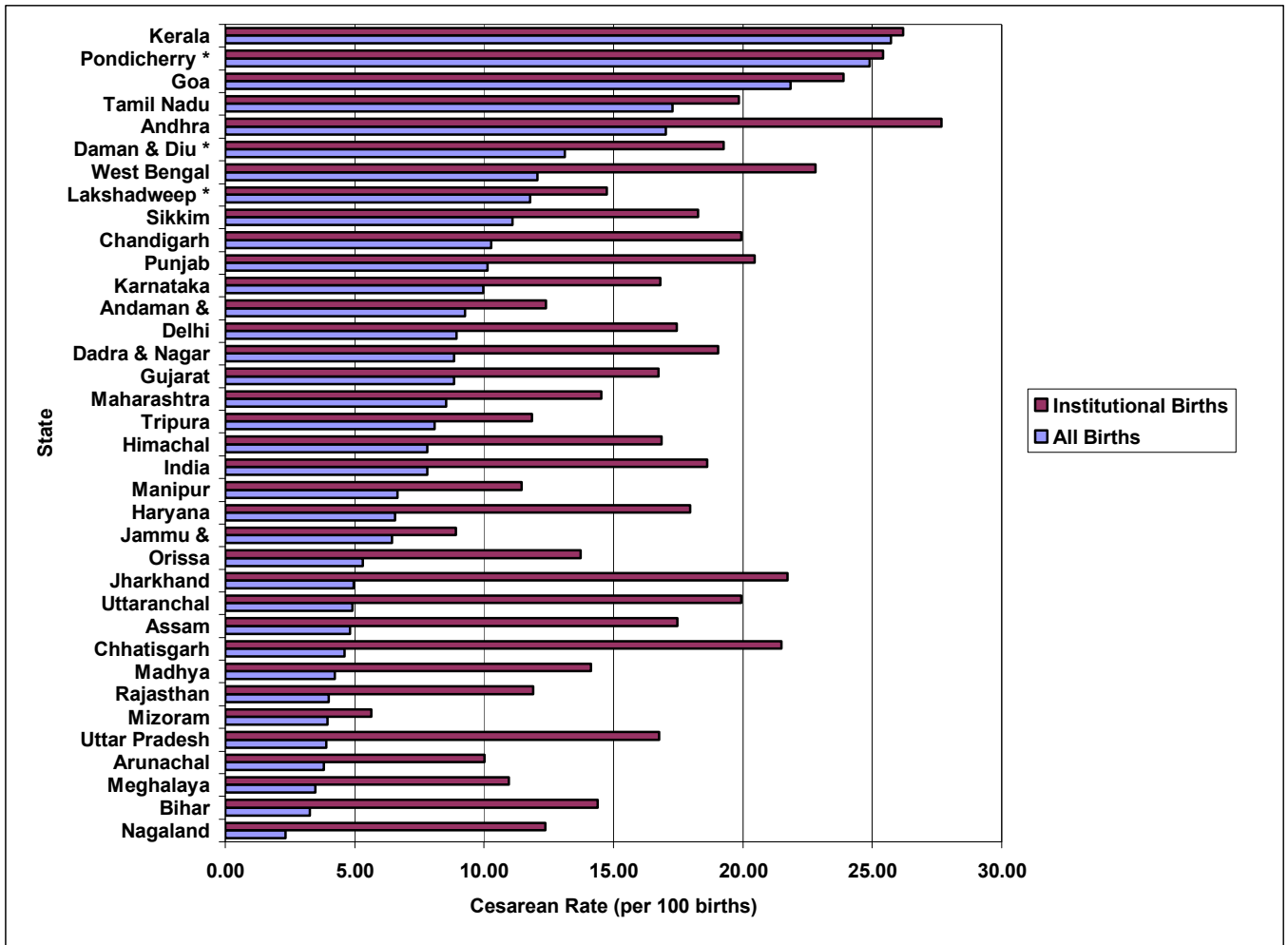


Table 2. Cesarean Rates for Institutional Births

State name	Place of Delivery					
	Rural			Urban		
	Public	Private	Total	Public	Private	Total
Andaman & Nicobar Islands *	11.85	22.17**	12.05	12.54	21.73**	13.57
Andhra Pradesh	14.11	34.07	26.60	19.27	34.37	29.14
Arunachal Pradesh	6.20	29.43	9.84	6.61	17.88	10.25
Assam	8.39	20.14	12.40	12.35	28.69	22.58
Bihar	6.64	14.90	12.70	7.85	18.69	16.28
Chandigarh	0.00**	0.00**	0.00**	20.90	25.89**	22.04
Chhatisgarh	11.32	22.76	15.40	23.07	26.25	25.03
Dadra & Nagar Haveli *	5.16**	18.12**	12.44	5.71**	32.25	26.47
Daman & Diu *	6.66	18.89	13.84	18.50**	29.49	26.60
Delhi	3.07**	23.96**	14.07	14.53	22.14	17.63
Goa	21.50	26.81	24.23	18.31	26.97	23.59
Gujarat	10.01	14.23	13.12	10.93	23.97	21.10
Haryana	14.31	19.45	17.85	12.20	20.45	18.12
Himachal Pradesh	12.87	34.34	15.76	16.20	35.49	19.26
Jammu & Kashmir	9.43	6.40	8.85	11.16	2.84	9.07
Jharkhand	15.89	21.78	20.21	13.68	25.04	22.49
Karnataka	10.71	18.51	13.92	11.24	26.12	20.11
Kerala	20.29	26.63	23.99	28.50	32.69	30.99
Lakshadweep *	13.01	67.58**	15.85	7.63	51.42**	13.37
Madhya Pradesh	8.30	15.73	10.51	10.94	24.78	17.04
Maharashtra	8.06	13.36	10.94	12.48	21.63	18.20
Manipur	10.24	20.09	12.05	7.62	25.31	9.94
Meghalaya	10.54	19.87	11.71	1.37	24.50	9.96
Mizoram	5.03	18.07**	5.82	4.28	12.46	5.48
Nagaland	18.70	11.47	14.74	12.94	7.80	10.18
Orissa	10.02	15.50	11.08	14.57	21.80	16.95
Pondicherry *	22.04	31.93**	23.25	19.45	39.92	26.00
Punjab	24.07	18.81	19.85	22.43	21.21	21.44
Rajasthan	8.01	12.63	9.58	13.83	15.26	14.45
Sikkim	17.27	36.30**	18.45	11.94	39.12**	17.50
Tamil Nadu	10.83	23.52	16.11	14.31	32.15	24.45
Tripura	9.59	32.74**	10.75	9.20	43.38**	14.61
Uttar Pradesh	8.89	15.06	12.29	15.06	24.81	21.85
Uttaranchal	13.99	21.79	17.98	16.22	26.46	22.31
West Bengal	11.11	30.80	14.80	23.22	50.08	32.50
India	11.00	20.47	15.68	15.33	26.60	21.98

** The rates are based on sample less than 50

Table 3. Odds Ratio and Significance of Caesarean Delivery Derived from Logistic Regression for All Births

Variables	Categories	Sig.	Exp(B)
Region	North®		
	Central		1.05
	North-East	***	0.76
	East	***	0.71
	West	***	0.53
	South	***	1.68
Place of residence	Rural®		
	Urban	***	1.16
Religion	Hindu®		
	Muslim	***	0.91
	Christian		1.01
	Others		1.07
Caste	Others®		
	SC	***	0.82
	ST	***	0.86
	OBC	***	0.84
SLI	Low®		
	Medium	***	1.22
	High	***	1.48
Women's education	Non-literate®		
	Primary		0.88
	Secondary		1.03
	> Secondary	***	1.25
Place of delivery	Public®		
	Private	***	1.70
Birth order	Birth order 1®		
	Birth order 2	***	0.89
	Birth order 3 and above	***	0.55
Age of mother at child birth	18 to 35®		
	<18 or >35	***	0.87
Multiple births	Single®		
	Multiple	***	1.79
Complication treated	No complication®		
	Complication treated	***	1.27
	Complication not treated		0.98
Delivery complications	No delivery complications®		
	1 delivery complication	***	5.66
	2 or more delivery complication	***	6.56
ANC	No ANC®		
	Some ANC	***	1.39
	Full ANC	***	1.73
Constant		***	0.03

*** p < .05

Table 4. Odds Ratio and Significance of Caesarean Delivery Derived from Logistic Regression for Institutional Births

Variables	Categories	Public		Private	
		Sig	Exp(B)	Sig.	Exp(B)
Region	North®				
	Central		0.92	***	1.16
	North-East	***	0.51	***	1.32
	East	***	0.70	***	0.70
	West	***	0.51	***	0.55
	South	***	1.28	***	2.03
	Rest		0.92		1.24
Place of residence	Rural®				
	Urban	***	1.14	***	1.18
Religion	Hindu®				
	Muslim		0.88		0.90
	Christian		0.92		1.19
	Others	***	1.30		0.95
Caste	Others®				
	SC	***	0.84	***	0.81
	ST		0.95	***	0.73
	OBC	***	0.85	***	0.83
SLI	Low®				
	Medium	***	1.21	***	1.23
	High	***	1.30	***	1.60
Women's education	Non-literate®				
	Primary		0.82		0.96
	Secondary		1.13		0.95
	> Secondary	***	1.30	***	1.19
Birth order	Birth order 1®				
	Birth order 2	***	0.89	***	0.90
	Birth order 3 and above	***	0.54	***	0.55
Age of mother at child birth	18 to 35®				
	<18 or >35	***	0.83		0.90
Multiple births	Single®				
	Multiple	***	1.79	***	1.80
Complication treated	No complication®				
	Complication treated	***	1.17	***	1.36
	Complication not treated		0.92		1.06
Delivery complications	No delivery complications®				
	1 delivery complication	***	4.68	***	6.68
	2 or more delivery complication	***	5.57	***	7.53
ANC	No ANC®				
	Some ANC	***	1.32	***	1.43
	Full ANC	***	1.81	***	1.67
Constant		***	0.04	***	0.04

*** p < .05

Table 5. Odds of Caesarean Births in Public and Private Institutions in the States

States	Institutional	
	Sig	Exp(B)
Andhra Pradesh	***	3.09
Arunachal Pradesh	***	8.51
Assam	***	2.50
Bihar	***	1.91
Chandigarh		2.87
Chhatisgarh		0.95
Delhi		1.87
Goa	***	0.33
Gujarat		1.18
Haryana		1.36
Himachal Pradesh		1.70
Jammu & Kashmir		1.26
Jharkhand	***	1.99
Karnataka	***	2.14
Kerala		1.23
Madhya Pradesh	***	1.71
Maharashtra	***	1.40
Manipur	***	3.09
Meghalaya	***	3.15
Mizoram	***	4.18
Nagaland		0.50
Orissa	***	2.13
Pondicherry *	***	2.91
Punjab		0.83
Rajasthan		1.08
Sikkim	***	5.30
Tamil Nadu	***	2.20
Tripura	***	5.70
Uttar Pradesh	***	1.74
Uttaranchal	***	2.96
West Bengal	***	1.88

*** p < .05

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