



CAESAREAN SECTION RATE IN A RURAL COMMUNITY IN THE KUMAON REGION

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ABSTRACT **Background:** Maternal and child health is usually accorded a high priority as this has implications for healthy and productive workforce. Institutional delivery as well as caesarean section (CS) delivery has significantly increased in the last two-three decades in India. This study aimed to determine prevalence and major determinants of CS delivery in women residing in the Kumaon region of Uttarakhand, India and having experienced childbirth within the last two years.

Methods: A population based cross sectional data collection regarding the mode of delivery and indication of caesarean section if so, was done as part of a larger follow up study to determine the incidence of acute effects following immunization (AEFI). Mothers with babies less than two years and getting their child vaccinated on fixed immunization sessions from eight randomly selected subcentres in the Haldwani block of Nainital district (Uttarakhand, India) were interviewed to collect data. Pre-tested semi-structured questionnaire was used for data collection.

Results: A total of 255 women were interviewed. About 89% deliveries were institutional deliveries and 37.3% of all the deliveries were through caesarean section. Almost three fourth (74.3%) of the deliveries at private health facility were CS deliveries compared to only 26.1% at government health facilities. Factors significantly associated with CS delivery included type of facility where delivery was conducted and increasing age, socio-economic status and educational status of the study participants.

Conclusions: We conclude that the CS delivery rate is high in general in our study population and is especially so when the delivery is being conducted at private health facilities.

KEYWORDS : rural health, maternal and child health, institutional delivery

Introduction

Maternal and child health care is one of the essential components of any health service package. There are multiple reasons for prioritizing maternal health. The reasons include social investment made in bringing up a girl child to become economically and socially productive member of society - maternal morbidity may potentially compromise ability of these women to contribute to society for a long time as most pregnancies occur in early adulthood^[1]. Maternal health is also strongly correlated with the health and well being of her newborn child - increased infant mortality has been observed if mother of the child dies during or soon after delivery.^[2,3] Similarly child health is prioritized for ensuring a healthy and productive population in future. In India, the number of deliveries being conducted in health care facilities has markedly increased in last decade and half. The rate of institutional deliveries has increased from 39 per cent to about 80 per cent between 2005-6 and 2015-16.^[4] This shows that there is greater awareness and understanding of the need to have a safe delivery in the community at large. Also the access to health care institution providing delivery services and equipped with caesarean section facilities have improved over a period of last few decades. It is reflected in the increased prevalence of CS deliveries reported in the national health surveys over last three decades. The national prevalence of CS delivery has increased to almost six times in 2015-16 (17.2 %) compared to that in 1992-93 (2.9%).^[4,5] The caesarean section rate is estimated to be lower in rural India (12.8%) [NFHS-4]. Comprehensive obstetric care includes package of multiple services and interventions - including CS delivery when needed, to ensure maternal and neonatal survival and well being.^[6] Though CS delivery remains a safe and effective procedure in appropriately trained hands, in literature the reported rate of complications associated with CS delivery is between 8 and 12 percent^[7,8] Some of the complications may be life threatening or result in permanent morbidities in these women. This paper highlights the

high prevalence of CS deliveries even in a rural community of Kumaon region of Uttarakhand.

Methods:

Study type and settings: The findings reported in this paper were obtained as part of a larger study planned and executed to determine incidence rate of Adverse Events Following Immunization (AEFI) among children aged less than two years of the Kumaon region of Uttarakhand. The parent study^[9] was a longitudinal study where children were identified on the vaccination site on fixed vaccination days on randomly selected subcentres and followed up for 30 days after vaccination through multiple visits to their homes. Data collected and relevant to this paper included history of events around births including mode of delivery and indication of caesarean section if delivery was done through a caesarean section. The history was taken from mothers of these children. We present the results of cross-sectional data collected which is related to mode of delivery and associated socio-demographic variables obtained from the study participants during these interviews.

Study population: All women who had a child aged less than two years of age on the first day of data collection and were residing in the Haldwani block of district Nainital at the time of delivery.

Study subjects: Women who had a baby aged two years or less and got their child vaccinated on fixed immunization days on the days of visit to one of the study subcentre, and agreed to participate in the study. It was planned to exclude those women who were unable to comprehend and respond to the questions asked during the interview. However, no woman was excluded from the study for this reason.

Sampling strategy: Eight subcentres from Haldwani Block of

Nainital District of Kumaon region in Uttarakhand were selected in total. Using a map, the Block was divided into four parts - Northeast, Northwest, Southeast and Southwest. Two subcentres from each part were selected randomly after obtaining a list of all subcentres in the block (a total of 24 in number). Each selected sub-centre was visited to cover four consecutive fixed immunization sessions. All mothers of children less than two years getting vaccinated, were enrolled into the study and interviewed using a pre-tested, semi-structured questionnaire.

Sample size: As the finding in this paper are result of conducting of a larger study to determine AEFI incidence among children less than two years, sample size was not calculated for determining the prevalence of CS delivery in the study population beforehand. However, for determining prevalence of CS delivery with 95% confidence interval in the study population with precision of 5% and assuming expected prevalence of CS delivery to be same as reported in the National Family Health Survey 4 (NFHS 4) data for Uttarakhand State (i.e. 13.1%)^[4] and putting these values in the 'Population survey or descriptive study' window of the 'Statcalc' option of the 'Epiinfo™' software version 7.2.2.2 for eight clusters and design effect of 1.25 a minimum sample size of 224 is reached. In our study we interviewed 255 women, which shows that the sample size was adequate to determine prevalence of CS delivery in our study population, even if we did not calculate the sample size prior to the study for this specific objective.

Ethical issues: The parent study - presented data and results are part of which - was approved by the institutional ethics committee before start of the data collection. All interviews to collect data were conducted after obtaining written informed consent of the study participants. Data confidentiality was maintained throughout the study period and during analysis and while presentation of results. Any women or her child if found to need medical care was given primary advise at the time of the interview and was also referred to nearby health facility if required.

Data management: Data was collected using pre-tested, semi-structured questionnaires through face to face interviews with study participants. Thereafter, it was entered and cleaned in Microsoft Excel worksheet and analyzed in Statistical Package for Social Sciences (SPSS) software version 16.0 and 'Epiinfo' software version 7.2.2.2. Data is presented in frequencies and percentages where appropriate. Associations were tested for statistical significance using Chi square test in SPSS and Chi square for trend done in Epiinfo where ever appropriate.

Results:

A total of 255 eligible women were interviewed. The results are presented for all of them. The socio demographic variables of the study participants have been presented in the table 1. Most of the women in the study were aged between 21 to 30 years of age (78.9%). Very few women (6.3%) were having no education at all. At the same time only a handfuls study participants were involved in paid employment (3.9%). The families studied were almost evenly distributed into higher (upper and upper middle), middle and lower (lower and lower middle) socioeconomic status according to the modified BG Prasad socioeconomic scale classification.^[10] Majority of the women in our study lived in joint families (64.3%). The participants were almost equally distributed into those having first delivery and those who had at least one delivery before.

Table 1: Distribution of the study participants by selected socio-demographic variables (N=255)

Socio-demographic Variable	Numbers	Percent
Participants' age		
<21 years	22	8.6
21-25 years	94	36.9
26-30 years	107	42.0
>31 years	32	12.5
Participants' education		
Illiterate	16	6.3
Primary	12	4.7
Middle	31	12.1
High School	48	18.8
Intermediate	39	15.3
Graduate and above	109	42.7

Family's socioeconomic status		
Lower	32	12.5
Lower middle	62	24.3
Middle	81	31.8
Upper middle	65	25.5
Upper	15	5.9
Participants' Occupation		
Housewife	245	96.1
Employed	10	3.9
Family Type		
Nuclear	91	35.7
Joint	164	64.3
Deliveries in the past (excluding abortions)/ Birth order		
One only	110	43.1
More than one	145	56.9

Table 2 shows the distribution of deliveries including CS deliveries among the study participants. In our study, large majority of the deliveries (89%) were institutional deliveries. The prevalence of caesarean section in our study was unexpectedly high with more than one-third women (37.3 per cent) having undergone CS delivery. Almost three fourth (74.3%) of the deliveries occurring at private health facility were conducted through caesarean section while only a quarter of deliveries (26.1%) at government health facilities were conducted through caesarean section.

Table 2: Deliveries and their distribution according to selected variables:

S. No.	Variable	Numbers	Percent
1.	Total Deliveries	255	100
2.	Vaginal Deliveries	160	62.7
3.	Caesarian Section Deliveries	95	37.3
4.	Institutional deliveries	227	89.0
	4a. Government facility (n=227)	153	67.4
	4b. Private facility (n=227)	74	32.6
5.	Institutional delivery - Caesarian Section (n=227)	95	41.8
	5a. Government Facility (n =153)	40	26.1
	5b. Private Facility (n = 74)	55	74.3

Table 3: Association of type of delivery with selected socio-demographic and health facility variables (N=255):

Variable	Type of delivery		P value (p value*)
	Normal (n = 160)	LSCS (n=95)	
Participants' age			
<21 years	15(68.2)	7(31.8)	0.035 (0.0141)
21-25 years	65(69.1)	29(30.9)	
25-30 years	67(62.6)	40(37.4)	
>30 years	13(40.6)	19(59.4)	
Participants' education			
Illiterate	14(87.5)	2(12.5)	<0.001 (0.0095)
Primary	10(83.3)	2(16.7)	
Middle	23(74.2)	8(25.8)	
High School	35(72.9)	13(27.1)	
Intermediate	28(71.8)	11(28.2)	
Graduate and above	50(45.9)	59(54.1)	
Family's socioeconomic status			
Lower	17(53.1)	15(46.9)	0.051 (0.0061)
Lower middle	35(56.5)	27(43.5)	
Middle	47(58.0)	34(42.0)	
Upper middle	49(75.4)	16(24.6)	
Upper	12(80.0)	3(20.0)	
Participants' Occupation			
Housewife	156(63.7)	89(36.3)	0.129
Employed	4(40.0)	6(60.0)	
Family Type			
Nuclear	62(68.1)	29(31.9)	0.185
Joint	98(59.8)	66(40.2)	
Birth order			

First	59(53.6)	51(46.4)	0.009
Second and above	101(69.7)	44(30.3)	
Institutional delivery - Facility Type (n =227)			
Government facility	113(73.9)	40(26.1)	<0.001
Private facility	19(25.7)	55(74.3)	

*Chi square for trend p value

Table 3 shows associations including statistical, of caesarean section with the selected determinants studied in the study. CS delivery was significantly more frequent with increasing age, higher educational accomplishment and better socioeconomic status of women in the study as evident from the highly significant p values for the chi square for trend test in the table 3. Delivery at a private health facility was strongly associated with the delivery conducted through a caesarean section and the result is statistically highly significant (p value < 0.001). Employed women and those living in joint families underwent CS delivery more frequently but were not found significant on statistical testing.

Table 4: Indications of LSCS among study participants who underwent LSCS (n=95)

Indication	Number	Percent
Previous LSCS	41	43.2
Non progress of labour	14	14.7
Post dated pregnancy	6	6.3
Foetal Distress	5	5.3
Cord around neck	5	5.3
Oligohydramnios	3	3.2
Patient choice	2	2.1
Not specified by doctor	2	2.1
Obstructed labour	1	1.1
Multiple pregnancy	1	1.1
Elderly mother	1	1.1
IUGR	1	1.1
Not ascertained unambiguously	13	13.7

Table 4 presents the indications for the caesarean section as told by the study participants (if records were available, they were reviewed). More than two-fifth (43.2%) of the study participants underwent CS because they had undergone CS previously. Another quarter (26.3%) underwent CS because of non-progress of labour, post dated delivery or foetal distress. Only 2.1% women had CS delivery because of their preference for CS delivery (0.78% of all women in our study). Two women were not adequately informed of the indication of caesarean section while another 13 women could not explain or produce documents for clear identification of indication for CS delivery.

Discussion:

A population based caesarean section (CS) rate of about 13 to 15 per cent can be expected as per the World Health Organization documents. There may not be any benefit of CS delivery beyond these recommended levels in terms of maternal or neonatal outcomes.^[11,12,13] However, we report a high prevalence of CS deliveries from the Kumaon region in Uttarakhand – more than one third women (37.3%) in our population based study had CS delivery. This is much higher than reported for India by most of the studies, where this prevalence ranges from less than 10% to about 20% only.^[14,15,16,17,18] Only one study from South India (32.6%) has reported a comparable prevalence of CS deliveries.^[19] Our finding also corroborates to the reported finding of rising trend of CS deliveries in India as well as globally in last few decades.^[15,17,18,20,21] In our study, three out of four deliveries at private health facilities (for profit health facilities) were through CS, which is about three times the rate of CS deliveries in public health facilities. Higher rates of CS in private health facilities was also reported in a district level health survey 4 (DLHS 4) secondary data analysis study (13.7% versus 37.9%) from India^[22] and other studies both from India as well as outside.^[19,20,23,24]

At least some of the CS deliveries in our study (Table 4) had either no medical indication (for example women who opted for CS delivery by choice) or had only a relative indication of caesarean section^[25] and a trial of labour in such circumstances could have been more appropriate step rather than embarking upon CS. Our study had a relatively high proportion of women having previous CS deliveries (16.1%) all of

whom underwent repeat CS for delivery during the index childbirth. It has been shown that trial of labour after previous CS (TOLAC) is safe.^[26] In fact, the guidelines for clinical practice from the French College of Gynecologists and Obstetricians state that the risk-benefit ratio considering the risks of short- and long-term maternal complications is favorable to TOLAC in most cases.^[27] Studies have reported that unwanted (without indication) CS delivery is associated with negative effects on both the maternal and neonatal outcomes.^[15,28,29,30] The quality of life of Indian women who delivered through a caesarean section has also been shown to be inferior to the women who deliver vaginally, at least in first three weeks after delivery.^[31] It must also not be forgotten that CS delivery not only has immediate intrapartum risks (eg. infection, blood transfusion) but also post-partum risks (eg. thrombo-embolism) and adverse effects on later pregnancies (increased risk of uterine rupture, placental anomalies etc.)^[25] Thus an avoidable CS delivery not only compromises the quality of life of women, it also puts financial burden on the family and risks the future health of the women and their future children if they plan to have children in future; for no benefit to either the mother or the neonate.

The factors associated with CS delivery in our study were increasing age, higher educational status, and better socioeconomic status of the study participants. These factors associated with CS delivery are also relatively well documented in literature.^[14,21,25,32] Increasing educational status and better socioeconomic conditions may play a role by affecting the behavior and expectations of both the parturient woman herself and the attending health care provider - in being very cautious about the pregnancy outcome; thus not willing to take the little uncertainty and minimal risk associated with a normal vaginal delivery, when the patient can understand and is ready to pay for CS delivery.^[33] Other factor playing a role could be the fear of accusation of being negligent on the part of health care provider by the patient or her relatives and subsequent legal issues if anything goes wrong with the mother or the baby.^[21,34] Therefore, CS delivery as a defensive medical practice may be preferred by the health care providers where situation can be better controlled and managed by them, rather than taking a minuscule chance with the vaginal delivery and its uncommon unforeseen, unpredictable complications. Financial incentives, especially in the for-profit health care sector, as cause of increased CS deliveries can also not be ruled out.^[21,35] Employed women also tended to have caesarean section more frequently in our study compared to homemakers. This may be because employment is often associated with higher educational status and better socioeconomic status which have been documented as positively associated with increased incidence of CS delivery. However, the numbers in the employed women category were far too less to meaningfully test for statistical significance.

In this study, we could not ascertain reason for CS delivery from 15 study participants - two of them complained that they were not adequately explained while another 13 women could not properly explain the reasons for caesarean section. Records were sought but were not available with these women. CS delivery being a major life event, it is unlikely that women would forget the cause of caesarean section if they/ their spouse or family members had received adequate information in the language they could properly apprehend. A part of this may be due to inadequate/ ineffective communication about maternal and foetal condition during peripartum period and indication of CS by the health care staff to these women and their family members. This may be partially due to pressures of time and workload on the part of health care team in usually overloaded health facilities, especially the public health facilities. However, as full free informed consent is an essential part of health care provision this responsibility needs to be identified and given enough time by all health care providers.

Limitations of the study: The socio-demographic data reflects the socioeconomic condition of the study participants at the time of data collection which might not have been the same at the time of delivery (up to two years earlier). However, in our view extreme changes in education, or family income are unlikely and not likely to significantly change interpretation of study results. Also this is a cross sectional study thus the associations reported should not be interpreted as being causal in nature. As the study is based in a single block of Nainital district and covers predominantly rural population; generalization of study results may be limited.

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