

Research Article

A POPULATION BASED COMPARATIVE STUDY OF MATERNAL OUTCOMES IN URBAN AND RURAL AREAS OF SURAT DISTRICT

***Dhaval Mahadevwala and Pradeep Kumar**

¹*Department of Community Medicine, Srinivas Institute of Medical Science & Research Centre, Mukka, Mangalore*

²*Department of Community Medicine, GMERS, Sola, Ahmedabad*

**Author for Correspondence*

ABSTRACT

During delivery ideally there should be no morbidity and mortality to either mother or child but because of various factors involved such as biological, social, environmental etc. the process becomes complicated and need medical assistance in order to ensure a healthy outcome that is delivery of a healthy child and quick recovery of mother with nil to minimum morbidity. Total 370 deliveries studied in rural and urban areas. It was found that urban areas had a high proportion of CS rates (37.6 %) in comparison to the rural area where it was 6.5 percent. In urban majority 98.9 percent of the deliveries were institutional based, reverse scenario was observed in rural area where majority (62.7%) deliveries were home based. More caesarean delivery occurred in educated and working women in urban area as compared to rural area. More caesarean delivery occurred in higher socioeconomic class and normal delivery in lower socioeconomic class. Education, working status of women, higher socioeconomic class and living area are found to be positive determinants of Caesarean section.

Keywords: *Delivery, Caesarean Section, Risk Factors*

INTRODUCTION

Child birth through normal vaginal delivery is a natural process. During delivery ideally there should be no morbidity and mortality to either mother or child but because of various factors involved such as biological, social, environmental etc. the process becomes complicated and need medical assistance in order to ensure a healthy outcome that is delivery of a healthy child and quick recovery of mother with nil to minimum morbidity. Of various medical assistance, "Caesarean section (CS) is a medical boon". It's a surgical procedure which is always helpful to both mother as well as child (Hiralal, 2013).

In ancient obstetrics practice caesarean section had limited role due to inadequate facilities and it was done only during emergencies like cases of badly obstructed labour. At that time skillful obstetricians tried various methods to deliver the baby through vaginal passage, even at the cost of fetal well being and complicated vaginal deliveries were allowed. Obviously the rise in incidence of caesarean section is more directed to the welfare of baby besides saving the mother from risk of complicated vaginal delivery (Anil, 2006). Further when if performed in private sector (even in government sector), we cannot ignore its economic implications in terms of operative charges, cost of drugs, prolonged hospital stay and loss of wages of the patient as well as the attending family members. According to World Health Organization (WHO) caesarean rate in any community should be between 5 -15 Percent. WHO endorsed the principle that there is no region in the world where a population-based caesarean section rate exceeding 15% of all live-births is justified (Ronsmans *et al.*, 2002).

A scheme launched by Government of Gujarat in 2005 named Chiranjeevi Yojana, provides private practitioner gynecologists for institutional deliveries of BPL families. The private practitioner is given a package of Rs.1,75,000/- for doing 100 institutional deliveries. This scheme was launched mainly to promote institutional deliveries so that maternal mortality and infant mortality can be decreased. Under this scheme caesarean section rate was estimated to be around 7-8 percent even among qualified gynecologists. Maternal mortality rate and neonatal mortality rate also decreased after implementation of this scheme (Bhat *et al.*, 2006). In the past three decades the rate of caesarean births are increasing. This rise in caesarean section rates is an emerging area of concern in mother and child health care, since in the

Research Article

beginning this rising caesarean trends were seen only in western developed countries but now it is dramatically increasing in developing countries as well including India. Monitoring the time trends in caesarean rates has been considered a useful approach in recognition of the changing health policy and also helps in estimating the magnitude of this condition in community (Mehta *et al.*, 2001).

In India most of studies to estimate the extent of CS were hospital based (Mehta *et al.*, 2001; Shukla and Dalal). Institute based data have little validity because such information from private sector is difficult to obtain and we all know that bulk of such surgeries are performed in this sector alone. Proportions of caesarean sections in private sectors largely remain unknown. Only few are population based studies that too with focus on urban area (Sreevidya and Sathiyasekaran, 2003; Bhasin *et al.*, 2007; Pai *et al.*, 1999). There is very few studies, which are population, based and tend to compare the rural/urban differences which have been most visible in NFHS data. Economic prospective and development in Gujarat state has brought the health services even in remote rural areas. With this background it was proposed to conduct this study in general population for rural/urban area of district Surat.

Aims and Objectives

1. To obtain an estimate of maternal outcome rates in rural and urban communities of Surat district.
2. To compare various factors like (medical, socio – economical) responsible for it in urban and rural settings.

MATERIALS AND METHODS

The present study was a population based study cross sectional study conducted in two different area of Surat district. The tool used to gather information was a pre designed and pre tested semi structured Performa comprising of 2 schedules namely

1. General schedule for information of all families in the study area with special emphasis on all eligible couple to be filled up in eligible couple schedule.
2. Schedule to gather information about the delivery experiences to be filled up for all couples who had at least one delivery experience in last three years, done by interviewing the couple preferably female partner.

Calculation of sample size: A population based cross sectional study from Chennai city published in 2003 using the cluster sampling method which found the caesarean rate as 32.6 percent (95% CI 27-38), was used for sample size calculation (Sreevidya and Sathiyasekaran, 2003). It is well known that Caesarean Section rate in rural population are less than urban population. We presume Caesarean Section rate to be 20 percent less than urban areas. Accordingly caesarean proportion in rural population can be around 26.08 percent. Incidentally the lower Confidence interval in the above study was 27 percent so the assumed Caesarean Section rate in rural areas has to be less than this (for hypothesis generation). Using this data in the formula with power of study 80 percent at 95 percent level of significance sample size was calculated (Kirkwood, 1998).

$$\text{Sample size} = \frac{[\mu \sqrt{P_1 Q_1} + v \sqrt{P_0 Q_0}]^2}{(P_1 - P_0)^2}$$

P_1 = 32.6 percent (Caesarean rate in urban population),

P_0 = 26.08 percent (Caesarean rate in rural population),

μ = 0.84 with power of study 80 percent Type II error is 0.2

v = 1.96 at 95 percent level of significance. Type I error is 0.05

P_0 is the proportion of Caesarean Section in general or rural community. We assume it to be less by 20 percent in general (rural community). It comes out to be 26.08 percent. It is also beyond the lower limit of 95 percent CI (27 %).

According to above equation, sample size is 370 deliveries each in both urban and rural areas respectively. We took into the account the experience of 3 years (as is done in NFH surveys). Therefore each study women was interviewed for her maternity experiences of last 3 years (based on memory recall and assessment of available case records). Unit of the study was maternity exposure and not a particular

Research Article

woman. It happened in many cases where 1 woman had more than 1 maternity experience in the identified period, accordingly the experiences were considered till the defined sample size of 370 was achieved. In order to achieve 370 maternity experiences in rural and urban areas total 312 and 354 women respectively were studied.

Selection of study area: Since the primary objective is to compare maternal outcome rates in rural and urban areas, randomization was not done and instead of this we tried to select typical rural and urban (not slums) areas.

Inclusion criteria for

a) Urban area: - Area under the jurisdiction of Surat Municipal Corporation (SMC) excluding the identified slum pockets as they do not reflect true urban situation.

b) Rural area: -Area should be rural (excluding peri urban, town or taluka headquarters)

-Health facility for caesarean should be available within range of 10 kms.

Urban: From urban area in Surat, central zone (Sagrampura) was selected randomly by lottery method and families were selected serially from the central point of the residential areas of the zone till the desired sample size was achieved.

Rural: Similarly a typical rural area (excluding the, peri urban area, town or taluka headquarters) was selected in consultation with CDHO at Zilla Parishad, Surat. In present study rural part of Mangrol taluka was selected. Selection of study population was similar to that of urban areas.

Study period: November 2008 to March 2009 on all working day between 9 A.M. to 5 P.M.

Study type: Cross sectional population based study.

Study area Details: Surat district is situated in South Gujarat region near to Maharashtra. Surat city is under Chouryasi taluka. In Surat Sagrampura is situated in central zone attached to ring road from Udhana darwaja to Majura gate. It comprises of people mainly of native of Surat. There are two Surat Municipal Corporation (SMC) run maternity homes Kadiwala Health Centre situated at Navsari bazaar road and Kshetrapal Health Centre situated at Kshetrapal temple road. New Civil Hospital of Surat is just 500 meters away from Sagrampura. Total number of household are around 13531, total population were 77316. Total area is 1.31 square kms.

Mangrol taluka is situated 70 kms away from Surat. Nearest big railway station is Kosamba, situated at a distance of 25 kms from Mangrol. Nearest hospital is 2 kms away, but private nursing home with Caesarean section facility is situated at a distance of 8 kms. It has two parts Mangrol urban and Mangrol rural. Present study done in Mangrol rural part. Mangrol rural population comprises of two portions, one is Mangrol proper village population and other is tribal population. Total households are 1576. Total population is 6489. Total area in square kms is 5.8.

During visit to each house information about purpose of study and maintaining confidentiality were given and verbal consent of the head of the family was obtained before getting information about family and child birth in last 3 years. In each family first general information about family members and information of eligible couples were recorded and if any delivery experience was found in eligible couple in last 3 years then information of that delivery were obtained.

Data Entry and Analysis

Data entry was done in Microsoft Excel in computer and data analysis and interpretation of tables were done by using SPSS statistical software version 17 and appropriate test were applied.

RESULTS AND DISCUSSION

Results

Table 1: The primary objective of our research was comparison of maternal outcome rates in urban and rural areas; it was found that urban areas had a high proportion of CS rates (37.6 %, 95% CI 32.7 - 42.5) in comparison to the rural area where it was 6.5 percent (95% CI 4 - 9). In rural areas a high proportion of deliveries were by normal vaginal route (93.5%) as compared to urban (62.4%). On applying chi square test a p value of less than 0.0001 is obtained indicative of a highly significant difference between performing CS in rural and urban areas. In urban majority 98.9 percent of the deliveries were institutional

Research Article

based, as compared to home deliveries which were contributed to very negligible only 1.1 percent. On the other part reverse scenario was observed in rural area where majority (62.7%) deliveries were home based, so gross difference was found in institutional based and home based deliveries in both areas. On applying chi square (with Yate's correction) a p value less than 0.0001 was obtained, indicative of highly significant difference between institutional and home deliveries in rural and urban areas.

Table 2: On comparing relation between working status of women and maternal outcome it was found that in rural area only 1 out of 142 working women has undergone CS, while in urban area 50 percent (7 out of 14) working women had undergone CS in past, indicative of more CS proportion among working women in urban area. On applying chi – square test (with Yates correction) for rural area a p value of less than 0.0001 was obtained ,indicative of highly significant difference for job status and mode of deliveries in rural area. On applying chi – square test for urban area a p value of more than 0.05 was obtained, indicative of no significant difference for job status and mode of deliveries in urban area.

Table 3: On comparing education of women it was found that in rural area majority of caesarean occurred in literate women. On applying chi – square test (with Yates correction) a p value of less than 0.001 was obtained ,indicative of highly significant difference for education and type of deliveries in rural area. In contrast to that all caesarean delivery occurred in educated women in urban area.

Table 4: On comparing mode of delivery to socio economic classification it was found that in rural area more CS occurred as compared to normal deliveries in upper class, as level of socioeconomic class decreases CS proportion also decreases. However in urban area also similar situation was found but here proportion of CS was very high as compared to rural in socio economic class 1 and 2.

Table 5: On comparing relation of birth order to CS, it was found that as the birth order increases proportion of CS in relation to normal deliveries decreases in both areas. Majority of CS occurred during 1st birth order followed by 2nd and 3rd. No CS found after 3rd birth order in both areas.

Table 6: In term of sex of newborn outcome of CS in rural area at any birth order was almost same for both male and female sex, while in urban area it was favouring male sex at every birth order. In fact with increasing birth order, the outcome of CS becomes more and more favouring male child.

Table 1: Mode of deliveries and place of deliveries in urban and rural areas

Mode of delivery	Rural No. (%)	Urban No. (%)	X ²	df
Caesarean	24 (6.5)	139 (37.6)	104.06	1
Vaginal	346 (93.5)	231 (62.4)		
Total	370 (100)	370 (100)		

Place of delivery	Rural No. (%)	Urban No. (%)	X ²	df
Institutional	138 (37.3)	366 (98.9)	320.58	1
Home	232 (62.7)	4 (1.1)		
Total	370 (100)	370 (100)		

X² = Chi square, df = Degree of freedom

Table 2: Distribution of job status of women and mode of delivery in both areas

Job status	Caesarean No.	Vaginal No.	X ²	df
Rural				
Working women	1	142	11.36	1
House wife	23	204		
Total	24	346		
Urban				
Working women	7	7	0.96	1
House wife	132	224		
Total	139	231		

X² = Chi square, df = Degree of freedom

Research Article

Table 3: Distribution of education of mother and type of delivery in both areas

Education	Caesarean No.	Vaginal No.	X ²	df
Rural				
Illiterate	1	143	11.52	1
literate	23	203		
Total	24	346		
Urban				
Illiterate	0	3		
literate	139	228		
Total	139	231		

X² = Chi square, df = Degree of freedom

Table 4: Relation of Socio economic classification and outcome of pregnancy

Socio economic class	Rural		Urban	
	Total No.	CS No. (%)	Total No.	CS No. (%)
1	12	3 (25)	168	75 (44.6)
2	51	9 (17.6)	165	60 (36.4)
3	33	2 (6.1)	34	4 (11.8)
4	142	7 (4.9)	3	0
5	132	3 (2.3)	0	0
Total	370	24	370	139

*as per modified Prasad's classification (Kumar, 1993)

Table 5: Distribution of birth order to CS

Birth order	Rural		Urban	
	Total No.	CS No. (%)	Total No.	CS No. (%)
I	119	11 (9.2)	209	91 (43.5)
II	145	9 (6.2)	133	42 (31.6)
III	72	4 (5.6)	26	6 (23.1)
≥ IV	34	0	2	0
Total	370	24 (6.9)	370	139 (37.6)

Table 6: Distribution of women who underwent for CS according to birth order and sex of baby delivered

Birth order	Rural			Urban		
	Male (%)	No.	Female (%)	Male No. (%)	Female No.	Total
I	5 (45.5)	6 (54.5)	11(100)	55 (60.4)	36 (39.6)	91(100)
II	5 (55.5)	4 (44.5)	9(100)	24 (57.1)	18 (42.9)	42(100)
III	2 (50)	2 (50)	4(100)	5 (83.3)	1 (16.7)	6(100)

Discussion

Total eligible couples in rural area were 853 and in urban were 1463. Usually there are at least 150 to 180 eligible couple per 1000 population (Park, 2013). However in the surveyed population more eligible couple were found in both areas (184 in rural and 196 in urban). It may be noted that urban population under study was situated in the heart of city and it was a settled population and was devoid of migration. In present study CS rate in urban area was 37.6 percent and in rural area it was 6.5 percent. WHO endorsed the principle that there is no region in the world where a population based CS rate exceeding

Research Article

15% of all live births is justified (Ronsmans *et al.*, 2002). In NFHS 3 percentage distribution of deliveries by CS in the urban area was 16.8 and in rural area it was 5.6 (National Family Health Survey 3, 2005-06). In present study it was found to be very high (more than 2 times than upper limit) in urban area, while in rural it was normal, much similar to NFHS 3 data (5.6%) (National Family Health Survey 3, 2005-06). The hazards (cost, morbidity etc.) outweigh the benefits of CS once its rates increase beyond 15 percent (Ronsmans *et al.*, 2002). Even in subsequent pregnancy if they opt for CS they do not understand hazards of CS so we have to educate women about it. The CS rates of 37.6 percent in present study in urban population raises serious questions about the indications of CS in this population. Residents in urban areas in the entire country have accessibility and affordability which explain more than 3 times high CS rates. This urban rate of CS was also even higher than study done by Sreevidhya *et al.*, (2003) at Chennai where it was 32.6 percent, which was a population based study in middle class population in Chennai and also from Bhasin *et al.*, (2007) in New Delhi where it was 34.4 percent. While working for finance purchase for Chiranjeevi Yojana government of Gujarat, we took CS rate of 7-8 percent which was acceptable to all gynaecologists who were in scheme (Bhat *et al.*, 2006). In that scheme CS rate among beneficiaries were 7-8 percent but unfortunately member from same population when attended private practice the CS rate was much higher (30.3 % in rural and 39.3 % in urban). If we look purely from medical and biological reason there were 3 times higher CS rates in urban in NFHS study which was more pronounced in our study, here also rural CS rates is compared very well with NFHS data but for urban it was much more than rural area. CS is a common operation with the significant long term consequences for women of child bearing age. It is therefore important to obtain an accurate understanding at national level as to why this operation is being performed in such high and varying proportions in different areas / institutes.

In present study in urban area institutional delivery rates were 98.9 percent and rest were home deliveries, which was consistent with study done by Bhasin *et al.*, (2007) in New Delhi (99.3%). In present study in rural area 37.6 percent deliveries were institutional based, which was much lower than that found in study by Kannan (2007), where it was 87.8 percent in rural area, as well as percentage of CS was also 24.7 percent, which was much higher than present study (6.8%). In rural area majority of deliveries occurred at home (62.4%). On comparing relationship by applying chi square (with Yate's correction) a p value less than 0.0001 was obtained, indicative of highly significant difference between institutional and home deliveries in rural and urban areas.

On comparing relation between working status of women and CS it was found that in rural area only 1 out of 142 working women has done CS, while in urban area 50 percent (7 out of 14) working women had undergone CS in past, indicative of more CS proportion among working women in urban area. On comparing relationship between job status and mode of deliveries, the difference was found to be statistically significant for rural area ($p < 0.0001$) but not for the urban area ($p > 0.05$). On comparing women's education and type of delivery it was observed that with an increase in the level of education, deliveries by CS increased and the relation was found to be statistically significant for rural area ($p < 0.001$). On comparing socio economic status in women who underwent CS in rural and urban areas, it was found that in rural area 50 percent CS occurred in class I and II, which accounted for only 27 percent of total families, while in urban area more than 97 percent of CS occurred in class I and II, which accounted for 88 percent of total families. On comparing mode of delivery to socio economic classification, it was found that in rural area more CS occurred as compared to normal deliveries in upper class, as level of socioeconomic class decreases CS proportion also decreases. However in urban area also similar situation was found but here proportion of CS was very high as compared to rural in socio economic class 1 and 2. Socioeconomic class has strong influence on decision to delivery by CS. It showed a positive strong relation between socioeconomic class and CS. In both area highest CS in comparison to normal deliveries were found in class 1 and 2. It indicates that purchasing power has much role in decision to delivery by CS.

On comparing the birth order and sex of baby, it was found that outcome of CS in rural area at any birth order was almost same for both male and female; while in urban area it was favouring male sex at every

Research Article

birth order. In fact with increasing birth order, the outcome of CS favoured more male child (57.1% for 2nd and 83.3% for 3rd birth order). On comparing relation of birth order to CS, it was found that as the birth order increased proportion of CS in relation to normal deliveries decreases in both areas. Majority of CS occurred during 1st birth order (9.2% in rural and 43.5% in urban) followed by 2nd (6.2% in rural and 31.6% in urban) and 3rd (5.6% in rural and 23.1% in urban).

No CS found after 3rd birth order in both areas. The possible explain for this may be that 1st and 2nd child considered to be precious and there are also chances of high risk pregnancy during this time so there is high chance of performing CS. In a study by Chanthasenanut *et al.*, (2007) an inverse relationship between birth order and CS rate was observed, in which CS rate proportion for 1st, 2nd, 3rd birth order were 44.1 percent, 39.6 percent and 12.8 percent respectively, indicative that CS were more done for 1st birth order and decreased as birth order increases. In study by Anil (2006) CS proportion in 1st birth order was 28 percent, in present study it was 43.5 percent (much higher). There was also no difference was observed in that study by Anil (2006) for CS rate in urban and rural area, where in present study gross difference was observed.

Conclusion

- CS rates observed in present study showed wide difference (37.6% in urban and 6.5% in rural), the increasing CS rates in urban area (37.6%) should be recognized as a public health problem, as it could contribute significantly to maternal and infant morbidity and mortality and also multiply the cost of maternal and child health care.
- In present study majority of CS found in socio economic class I and II, this is mainly due to better education and more affordability of that population for health care services.
- Education, socio economic status, job status of women and area of living (urban & rural) were found as positive determinants for opting for CS.
- Birth order showed inverse relationship with CS. As birth order increases CS rates decreases.
- The sex of newborn child showed no impact on CS rate in rural area, while in urban area it was found favouring male child.

Recommendations

- Safe reductions in the CS rates are possible, as hospital initiated programs can reduce CS use successfully by audit, review and action and by raising the fee for a vaginal delivery. At the same time there is a need to extend the facility of CS in rural area especially in government area or may be by a public private partnership like Chiranjeevi Yojana.
- Government should improve the existing health facilities, so that antenatal and delivery services should be provided to all the pregnant women, as CS is poorly accepted by the population because of the morbidity associated with the procedure, its high cost and its impact on fertility and there is currently no evidence that CS is safer than normal delivery.
- An interlinked close relationship should be established between primary health centres, community health centres, taluka headquarters hospitals, district hospitals and a tertiary referral centres. CS rate can be reduced by combined efforts at all levels and by encouraging hospital vaginal deliveries of all women by providing adequate fetal monitoring and operative facilities.
- There is also a clear need for systems that monitor and guide health care and medical interventions in the country as a whole.

REFERENCES

- Anil Kumar G (2006).** Antenatal history and caesarean section in southern part of Kerala, India, World Health and Population.
- Bhasin SK, Rajoura OP, Sharma AK, Metha Mukta, Gupta Naveen, Kumar Shishir and Joshi ID (2007).** A high prevalence of caesarean section rate in East Delhi. *Indian Journal of Community Medicine* 32 222-4.
- Bhat R, Singh A, Maheshvari S and Saha S (2006).** Maternal Health Financing Issues and options, a study of Chiranjeevi Yojana in Gujarat 7-10, Available: www.gujhealth.gov.in (as on 08-08-08).

Research Article

Chanthasenanont Athita, Pongroj paw Densak, Nanthakomon Tongta, Somprasit Charintip, Kamudhamas Atiwut and Suwannarurk Komsun (2007). Indications for Caesarean Section at Thammasat University Hospital. *Journal of Medical Association, Thai* **90** 1733-1737.

Hiralal Konar DC (2013). *Dutta's Textbook of Obstetrics*, 7th edition 588-598.

Kannan C (2007). A Cross-sectional Study of the Profile and Percentage of Institutional Deliveries among Currently Married Women of 15-45 Year Age Group in the Villages of Veerapandi Panchayat Union of Salem District, Tamil Nadu. *Indian Journal of Community Medicine* **32** 10-12.

Kirkwood Betty R (1998). *Essentials of Medical Statistics*, 1st edition 194 –196.

Kumar P (1993). Social Classification Need for constant upgrading. *Indian Journal of Community Medicine* **18** 60 - 61.

Mehta A, Apers L, Verstraelen H and Temmerman MJ (2001). Trends in Caesarean Section Rates at a Maternity Hospital in Mumbai, India. *Health Population Nutrition* **19** 306-312.

National Family Health Survey 3 (2005-06). International Institution of Population Sciences, Mumbai.

Pai M, Sundaram P, Radhakrishnan KK, Thomas K and Muliyl JPA (1999). High rate of caesarean sections in an affluent section of Chennai: is it cause for concern? *National Medical Journal of India* **12** 156-158.

Park K (2013). *Park's Textbook of Preventive and Social Medicine*, 22nd edition (Banarsidas Bhanot Publishers) 454.

Ronsmans Carine, Meave Oona, Campbell Renee, McDermott Jeanne and Koblinsky Marge (2002). Questioning the indicators of need for obstetric care. *Bulletin of the World Health Organization* **80** 317-324.

Shukla Ashok Kumar and Dalal Asha R (No Date). Changing Trends in Indications of caesarean section. Available: www.bhj.org.in/journal/2006_4801_jan/html/org_Changing_105-110.html (as on 27-02-15).

Sreevidya S and Sathiyasekaran B (2003). High caesarean rates in Madras (India): a population-based cross Sectional study. *British Journal of Obstetric and Gynecology* **110** 106–111.