



## Prevalence and Determinants of Caesarean Section in a Major District in Kerala

Authors

**Dr Saravanakumar T V<sup>1</sup>, Dr Nirmala C<sup>2</sup>, Dr Lekshmi Subramonian<sup>3</sup>**

<sup>1</sup>Associate Professor, Dept. of OBG, Govt. Medical College, Kollam

<sup>2</sup>Professor, Dept. of OBG, Sree Avittom Thirunal Hospital, Govt. Medical College, Trivandrum

<sup>3</sup>Dept. of OBG, Sree Avittom Thirunal Hospital, Govt. Medical College, Trivandrum

Corresponding Author

**Dr Reji Mohan**

Asst. Professor, Dept. of OBG, Sree Avittom Thirunal Hospital, Govt. Medical College, Trivandrum, Thiruvananthapuram, India

### Abstract

Worldwide rise in caesarean section rate during the last three decades, has been the cause of alarm and needs an in depth study. Caesarean section is one of the most common major surgical procedure performed now a days. The procedure is not benign and should be performed only when circumstances distinctly require it. Public perception of caesarean sections has seen a swing from a “failure of obstetric care” to being “safe for mother and child.” There have been occasions where an obstetrician has been manhandled for a poor outcome and blamed needlessly for not having performed a caesarean section. At the same time media glare has fallen unfavorably on the rise in rates of these procedures. Why have the rates increased and what are the strategies to reduce the rates of Caesarean sections? In this context, this study intends to find out the prevalence of caesarean section and also to identify the maternal, institutional and physician related determinants of caesarean section.

### Objectives

- To find out prevalence of caesarean section in Trivandrum district during the year 2010.
- To find out maternal, hospital and physician related determinants of caesarean section in Trivandrum district

**Materials and Methods:** Our study was a Descriptive study from four maternity care hospitals in Trivandrum district. Duration of our study was 6 months and sample size was 800.

**Results:** Our study shows that the prevalence of caesarean section in private institutions in Trivandrum district is higher in private hospitals when compared to public sector. The primary caesarean sections in the public and private health institutions were found to be 38.50% and 47.90% respectively. The mean age of women who underwent caesarean section was found to be 27. Our study shows that there is an increasing trend for caesarean section as maternal age increases. The association between age and type of delivery was found to be significant. Analysis also shows that as level of education increases, the chance for caesarean section increases. The association between educational status and type of delivery was found to be highly significant. It was observed that 52.2% of the upper strata, which constitutes 50.4% of the study population, underwent caesarean section. Among the middle strata, 50.9% underwent caesarean

section. In the lower socioeconomic strata, which constitutes 12% of the study population, only 37.5%) had a caesarean section. The results were statistically significant. Among the nulliparas, 55.1%) underwent caesarean section pointing to the increasing number of primary caesarean sections. The primary caesarean sections were 55.1% and repeat caesarean sections performed were 59.1%, in the population under study. The results were not statistically significant. 85.1% of the caesarean sections were done at gestational age of 37 weeks or more. 13.6% of the caesarean sections were done preterm. The results were found to be statistically significant. It was observed that among those who underwent caesarean section, the most common medical complication seen associated was hypertensive disorders of pregnancy followed by gestational diabetes mellitus. When bivariate analysis was done to compare women with and without medical complications, it was found that the chance of women with medical complications to undergo caesarean section was 2.559 times when compared with women without any medical complications (Odd's ratio = 2.559). About 59.5% and 54.5% of women underwent caesarean section in private and public health institutions respectively. Among the public institutions, 58% and 51% of the women underwent caesarean sections in non teaching and teaching institutions respectively. In this study it was observed more caesarean sections performed in the study population, were emergency caesarean sections. The results showed that 52.1% of caesarean sections done in private sector were elective caesarean sections and majority (59.63% >) of caesarean sections performed in public institutions were emergency caesarean sections. The results were statistically significant. Majority of the caesarean sections were performed for previous caesarean section (39.8%), and irrespective of the type of health institution, it is the most common indication for a caesarean section. 92.1% of caesarean sections took place during day time in private institutions which may be due to the high number of elective caesarean sections in these institutions. The results were not statistically significant. Caesarean sections were performed mainly during day time, but 91.6% of caesarean sections performed in private institutions were during day time. The results were statistically significant. It was observed that in the health institution where there was no round the clock availability of ancillary services like pediatric, anaesthetic, and blood bank services, the caesarean section rate was higher. In a health institution where the physician practice followed was of solo type, a higher caesarean section rate was found. 79.3% of the study population preferred vaginal delivery, whereas 20.8% preferred caesarean section. The results show that 60.1% > of the women who preferred caesarean section did so because they were advised by their obstetrician that undergoing vaginal delivery in the particular clinical situation would be risky for herself and/or her baby. 25.6% of them preferred caesarean section as they believed that it would be safer for their baby than a vaginal delivery. 12.5% were afraid and anxious of the pain they would have to experience during vaginal delivery. 1.8% of the women preferred caesarean section as they wanted their baby to deliver at an auspicious time. When the caesarean sections in the public health institution were analysed, it was observed that group V contributes most to the caesarean section rate (44.2%). This was followed by group II (30.16%). There were no cases under group IX. Group V contributes most to the caesarean section rate (36.6%) in private health institutions. This is followed by group II (30.7%). It can be seen that 18.1% of the caesarean sections come under group I which is high when compared to the public institutions.

**Conclusion:** The prevalence of caesarean section in Trivandrum district during the year 2010 was 38.14%. The prevalence of caesarean section in Trivandrum district during the year 2010 in private hospitals (40.87%) was higher when compared to public health institutions (35.58%).

In the subset of population under study, the primary caesarean section rate was found to be high-31.82% and 41.3% in the public and private health institutions respectively. The maternal factors found significant were age, educational status, socioeconomic status, gestational age at delivery and presence of associated medical complications. The maternal factors like parity, number of antenatal visits done were found not to have significant association.

Irrespective of the type of institution, majority of the caesarean sections were found to be repeat sections. Majority of the caesarean sections performed were emergency caesarean sections in the public institutions under study, and in private institutions, majority were elective caesarean sections.

Irrespective of the type of institution, majority of caesarean sections were performed on weekdays and during day time. Caesarean section rate was higher in the health institution where there was no round the clock availability of ancillary services like paediatric and blood bank services and also where solo type of

physician practice style was followed.

Majority of the women preferred vaginal delivery because it was the natural process of giving birth. Informed choice was not given to the patient. Most of the time, decision for the caesarean section was taken by the obstetricians themselves. Many of the women consider caesarean section to be safer for their baby and yet another few were afraid of the pain associated with normal labour.

The notable fact is that after Robson's group V (which includes repeat caesarean sections), majority of caesarean sections come under group II (which includes induced labours and pre labour caesarean sections) in all the institutions under study, pointing to the high number of inductions in nulliparous women, which is of course an unhealthy trend.

**Rationale of the study**

There has been a disturbing rise in caesarean section rates globally since last two decades. While rising caesarean section rates have been the subject of much attention & debate worldwide, in India and especially in Kerala, there is not much information available on this rate & its potential adverse impact on health of mother & baby & her future reproductive performance.

Raising trends of caesarean section has been reported from Kerala in recent years. Hospital based statistics in Trivandrum for the year 2009 shows high rates ranging from 30-50%. This is happening when the consensus recommendation for optimal CS rate made by WHO is 10-15%. Hence there is an urgent need to assess the burden of caesarean sections & its causes, so that appropriate intervention can be made to reduce caesarean section rates, thus popularising vaginal deliveries.

**Aims of the Study**

- To find out prevalence of caesarean section in Trivandrum district during the year 2010.
- To find out maternal, hospital and physician related determinants of caesarean section in Trivandrum district.

**Materials and Methods**

**Study Design:** Descriptive study

**Duration of Study:** 6 months

**Sample Size:** 800

**Data Collection**

The data for calculating the prevalence of caesarean section was collected from the monthly delivery statistics available from the Directorate of Health services, Trivandrum.

**Observations and Results**

**Prevalence of Caesarean Section in Trivandrum District**

Month	LSCS Private institutions	LSCS Public Institutions	Vaginal deliveries Private institutions	Vaginal deliveries Public Institutions	Total deliveries private institution ns	Total deliveries Public institution ns	Total delivers in Trivandrum district 2010
Jan – 2010	587 (39.56%)	595 (33.44%)	897 (60.44%)	1159 (66.08%)	1484	1754	3238
Feb – 2010	593 (39.30%)	588 (34.71%)	916 (60.70%)	1106 (65.29%)	1509	1694	3203
Mar -2010	463 (29.55%)	746 (34.25%)	1104 (70.45%)	1432 (65.75%)	1567	2178	3745
Apr-2010	738 (41.51%)	724 (35.25%)	1040 (58.49%)	1330 (64.75%)	1778	2054	3832

May – 2010	581 (33.37%)	730 (35.21%)	1160 (66.63%)	1343 (64.79%)	1741	2073	3814
Jun – 2010	772 (43.44%)	696 (34.27%)	1005 (56.56%)	1335 (65.73%)	1777	2031	3808
Jul – 2010	494 (41.51%)	798 (37.75%)	696 (58.49%)	1316 (62.25%)	1190	2114	3304
Aug – 2010	893 (48.93%)	685 (37.17%)	932 (51.07%)	1158 (62.83%)	1825	1843	3668
Sep – 2010	874 (47.42%)	764 (38.80%)	969 (52.58%)	1205 (61.20%)	1843	1969	3812
Oct – 2010	831 (42.20%)	786 (36.69%)	1138 (57.80%)	1356 (63.31%)	1969	2142	4111
Nov - 2010	792 (41.10%)	657 (33.90%)	1135 (58.90%)	1281 (66.10%)	1927	1938	3865
Dec – 2010	757 (42.60%)	630 (34.98%)	1020 (57.40)	1171 (65.02%)	1777	1801	3578
TOTAL	8375 (40.87%)	8399 (35.58%)	12012 (59.13%)	15192 (64.42%)	20387	23591	43978

The above table shows the monthly statistics of the deliveries in Trivandrum district during the year 2010. The total number of deliveries in the public health institutions, which includes deliveries conducted at CHCs, deliveries conducted at PHCs, deliveries conducted at sub centres, and deliveries conducted at sub-divisional hospital/district Hospital comes to 23,591 deliveries, out of which 8399 were caesarean sections and 15,192 were vaginal deliveries.

The total number of deliveries at accredited private Institutions in Trivandrum district in 2010 comes to 20,387 deliveries out of which 8375 were caesarean sections and 12012 were vaginal deliveries.

As a whole, there were a total of 44,028 deliveries in Trivandrum district during the year 2010.

The above table shows that the prevalence of caesarean section in private institutions in Trivandrum district is higher in private hospitals (40.87%), when compared to public sector (35.58%).

**Prevalence of Caesarean Section in Trivandrum District During the year 2010**

$$= \frac{\text{Total number of caesarean sections performed in the year 2010} \times 100}{\text{Total number of deliveries}}$$

$$= \frac{16774 \times 100}{43,978} = 38.14\%$$

**Primary Caesarean Section Rate**

Type of caesarean section	Number of caesarean sections		Total
	Public institutions	Private institutions	
Primary caesarean sections	84 (38.50%)	114 (47.90%)	198 (43.42%)
Repeat caesarean sections	134 (61.50%)	124 (52.10%)	258 (56.58%)
Total	218	238	456

In the study population, there were total 456 caesarean sections, out of which the number of primary caesarean sections in the public and private health institutions were found to be 84 (38.50%) and 131 (47.90%) respectively.

Primary caesarean section rate in public health institutions is 31.82%

Primary caesarean section rate in private health institutions is 41.30%

In the subset population under study, the following observations were made:

**1. Percentage of caesarean section according to age**

The mean age of women who underwent caesarean section was found to be 27. It can be seen from the table that there is an increasing trend for caesarean section as maternal age increases. 88.2% of the women in the 35- 39 age group underwent caesarean section, whereas only 29.03% of women underwent caesarean section



in the <20 years age group.

When bivariate analysis was performed using age 25 as cut off, the chance of women more than 25 years for a caesarean section was 1.69 times higher than women aged less than or equal to 25 years. When the age 30 was taken as cut off, the chance of women more than 30 years for undergoing a caesarean section was 2.28 times when compared to women aged less than or equal to 30 years (Odd's ratio=2.285). The association between age and type of delivery was found to be significant.

**2. Percentage of caesarean section according to educational status**

The result shows that as level of education increases, the chance for caesarean section increases. The association between educational status and type of delivery was found to be highly significant.

**3. Percentage of caesarean section according to socioeconomic status**

Socio-economic Status	Type of Delivery		Total
	Vaginal	Caesarean Section	
Lower strata	60	36	96
	62.5%	37.5%	12%
Middle Strata	148	153	301
	49.1%	50.9%	37.60%
Upper Strata	165	238	403
	48.00%	52.20%	50.40%
Total	344	456	800

From the above table it can be observed that 52.2% of the upper strata, which constitutes 50.4% of the study population, underwent caesarean section. Among the middle strata, 50.9% underwent caesarean section. In the lower socioeconomic strata, which constitutes 12% of the study population, only 37.5%) had a caesarean section. The results were statistically significant

**4. Percentage of caesarean section according to parity**

Parity	Type of Delivery		Total
	Vaginal (344)	Caesarean Section (456)	
NulliParous	192	236	428
	44.90%	55.10%	53.50%
Para 1	135	192	327
	41.20%	58.70%	40.90%
Para 2	17	28	45
	37.80%	62.20%	5.60%

53.5% of the study population was nulliparas. Among the nulliparas, 55.1%) underwent caesarean section pointing to the increasing number of primary caesarean sections.

**5. Percentage of caesarean section according to gestational age**

85.1% of the caesarean sections were done at gestational age of 37 weeks or more. 13.6% of the caesarean sections were done preterm. The results were found to be statistically significant.

**6 Percentage of caesarean section according to associated medical complications**

It was observed that among those who underwent caesarean section, the most common medical complication seen associated was hypertensive disorders of pregnancy (6.6%) followed by gestational diabetes mellitus (6%).

When bivariate analysis was done to compare women with and without medical complications, it was found that the chance of women with medical complications to undergo caesarean section was 2.559 times when compared with women without any medical complications(Odd's ratio = 2.559).

**7. Percentage of caesarean section according to type of institution**

Institution type	Type of delivery	
	Vaginal	Caesarean section
Public	182	218
	45.50%	54.50%
Private	162	238
	40.50%	59.50%

Chi Square: 1.976; P > 0.05; Odds ratio: 1.327

About 59.5% and 54.5% > of women underwent caesarean section in private and public health institutions respectively. Among the public

institutions, 58% and 51% of the women underwent caesarean sections in non teaching and teaching institutions respectively.

### 8. Distribution according to type of caesarean section

Elective/ Emergency	Institution Type		Total
	Public	Private	
Elective	88	124	212
	40.36%	52.10%	46.50%
Emergency	130	114	244
	59.63%	47.89%	53.50%
Total	218	238	456

Chi Square: 6.108; P < 0.05

In this study it was observed that out of the total 456 caesarean sections performed in the study population, 53.5% were emergency caesarean sections. The results showed that 52.1% of caesarean sections done in private sector were elective caesarean sections and majority (59.63%) of caesarean sections performed in public institutions were emergency caesarean sections. The results were statistically significant.

### 9 Distribution According To Indication Of Caesarean Section

Majority of the caesarean sections were performed for previous caesarean section (39.8%), and irrespective of the type of health institution, it is the most common indication for a caesarean section. The second commonest indications were cephalopelvic disproportion (11.6%), dysfunctional labor (11.2%), and failed induction (11.1%). This was followed by fetal distress (7.8%) and breech (5.3%).

### 10. Distribution According to Day of Delivery

92.1% of caesarean sections took place during day time in private institutions which may be due to the high number of elective caesarean sections in these institutions. The results were not statistically significant.

### 11. Distribution by Time of Delivery

The above table shows that in both public and private institutions, caesarean sections were performed mainly during day time, but 91.6% of caesarean sections performed in private institutions were during day time. The results were statistically significant.

### 12 Association between round the clock availability of ancillary services and type of delivery

It was observed that in the health institution where there was no round the clock availability of ancillary services like pediatric, anaesthetic, and blood bank services, the caesarean section rate was higher (63%).

### 13 Association between type of physician practice in each type of institution and type of delivery

The above results show that in the health institution where the physician practice followed was of solo type, a higher caesarean section rate (63%) was found

### 14 Preference of Mode of Delivery

79.3% of the study population preferred vaginal delivery, whereas 20.8% preferred caesarean section.

### 15 Reason For Preferring Caesarean Section

The results show that 60.1% of the women who preferred caesarean section did so because they were advised by their obstetrician that undergoing vaginal delivery in the particular clinical situation would be risky for herself and/or her baby. 25.6% of them preferred caesarean section as they believed that it would be safer for their baby than a vaginal delivery. 12.5% were afraid and anxious of the pain they would have to experience during vaginal delivery. 1.8% of the women preferred caesarean section as they wanted their baby to deliver at an auspicious time.

### 16 Distribution according to Robson's 10-group classification system

Robson's group	Public	Private
Group 1	21	43
	8.60%	18.10%
Group 2	73	73
	30.16%	30.70%
Group 3	5	5
	2.06%	2.10%
Group 4	14	3
	5.78%	1.30%
Group 5	107	113
	44.20%	36.60%
Group 6	7	17
	2.89%	7.10%
Group 7	5	4
	2.07%	1.70%
Group 8	1	3
	0.41%	1.30%
Group 9	0	0
	0.00%	0.00%
Group 10	9	3
	3.71%	1.30%

When the caesarean sections in the public health institution were analysed, it was observed that group V contributes most to the caesarean section rate (44.2%). This was followed by group II (30.16%). There were no cases under group IX.

Group V contributes most to the caesarean section rate (36.6%) in private health institutions. This is followed by group II (30.7%). It can be seen that 18.1% of the caesarean sections come under group I which is high when compared to the public institutions.

#### Conclusion

The prevalence of caesarean section in Trivandrum district during the year 2010 was 38.14%. The prevalence of caesarean section in Trivandrum district during the year 2010 in private hospitals (40.87%) was higher when compared to public health institutions (35.58%).

In the subset of population under study, the primary caesarean section rate was found to be high-31.82% and 41.3% in the public and private health institutions respectively. The maternal factors found significant were age, educational status, socioeconomic status, gestational age at delivery and presence of associated medical complications. The maternal factors like parity, number of antenatal visits done was found not to have significant association.

Irrespective of the type of institution, majority of the caesarean sections were found to be repeat sections. Majority of the caesarean sections performed were emergency caesarean sections in the public institutions under study, and in private institutions, majority were elective caesarean sections.

Irrespective of the type of institution, majority of caesarean sections were performed on weekdays and during day time. Caesarean section rate was higher in the health institution where there was no round the clock availability of ancillary services like paediatric and blood bank services and also where solo type of physician practice style was followed.

Majority of the women preferred vaginal delivery because it was the natural process of giving birth. Informed choice was not given to the patient. Most of the time, decision for the caesarean section was taken by the obstetricians themselves. Many of the women consider caesarean section to be safer for their baby and yet another few were afraid of the pain associated with normal labour.

The notable fact is that after Robson's group V (which includes repeat caesarean sections), majority of caesarean sections come under group II (which includes induced labours and pre labour caesarean sections) in all the institutions under study, pointing to the high number of inductions in nulliparous women, which is of course an unhealthy trend.

#### Recommendations

- The most important first step by any clinician or institution in reducing cesarean

birth rates is a commitment to keep high quality statistics. Monthly clinical audit of all complicated cases of pregnancy and delivery, including caesarean sections with its indications should be conducted in every health institution and at state level, especially in Kerala where caesarean section rates are soaring high.

- The primary focus in reducing the total caesarean section rate should be on bringing down the primary caesarean section rate. Early and unnecessary induction of labour should be reduced because failed induction is seen as the invariable cause for all primary caesarean sections
- Strict and clear cut management protocols for management of labour and delivery should be implemented in every health institution.
- The poor specificity of electronic fetal heart rate monitoring in diagnosing fetal distress must be recognized before proceeding to a caesarean section. In the presence of a non-reassuring fetal heart rate tracing, techniques such as fetal scalp stimulation, vibroacoustic stimulation, and even fetal scalp blood sampling may allow the clinician more confidence in pursuing labor in lieu of caesarean section.
- Tools like WHO partogram should be used, which clearly indicates the key events in a labour and which will give a proper indication as to when to opt for a C-section.
- The dying obstetric practices like external cephalic version for breech presentations at term, and instrumental deliveries should be promoted.
- Ideally, no caesarean section should be decided by an individual doctor and it should always be taken in consultation with a senior colleague. Policymakers should consider initiatives to encourage group practice formation in high-risk specialties such as obstetrics, as a pre-condition for providing full service delivery care .

- Proper ante-natal education and counseling should be given to women on the process of labour and the pain involved; pain management techniques and most importantly, educating the patient that a caesarean section is a major abdominal surgery with associated risks, including anaesthetic complications.
- In today's litigious society, the risk of litigation can be overcome by proper record keeping and documentation of case sheets.
- Educational efforts are to be directed at obstetricians, nursing staff and childbirth educators so as to popularize vaginal deliveries and to avoid unnecessary interference in the normal process of labour.

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