OPTING FOR A CESAREAN: WHAT DETERMINES THE DECISION?

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ABSTRACT

Objective: This study aims at determining the impact of maternal, physician, and hospital characteristics on cesarean section rates in Beirut. **Study Design**: Data was collected through a cross sectional survey from a proportionate random sample of 600 women delivering in 10 hospitals in Beirut. **Methods**: Biavariate analysis (Chi square tests and tests of means) and logistic regression analysis were done. **Results**: A 35% incidence rate of cesarean section was detected among all deliveries. Cesarean delivery was significantly associated with multiple gestation, gestational age, number of previous deliveries, site of prenatal care (private clinic vs. health center), time of delivery (morning vs. evening), day of delivery (weekend vs. weekdays), and history of previous cesarean delivery. **Conclusion**: The high cesarean rate in Beirut raises serious questions concerning the health consequences on women as well as the economic effects on the health care system. This calls for imperative intervention at the level of public awareness and practice guideline enforcement.

INTRODUCTION

Both developing and developed countries have witnessed a dramatic rise in the rate of cesarean births during the last three decades (Cai et al., 1998; Leung, Lam, Thach, Wan, & Ho, 2001; Martin, Hamilton, Ventura, Menacker, & Park, 2002). This increase, however, has not been clinically justified. In the United States (U.S.), where cesarean section was rated as the most common hospital surgical procedure(Burns, Geller, & Wholey, 1995; Rutkow, 1986) , it was estimated that half of the cesareans were medically unnecessary(Burns et al., 1995). Similarly in Latin America, it was estimated that over 850,000 cesarean sections were unnecessarily performed on an annual basis (Belizan, Althabe, Barros, & Alexander, 1999). Without a doubt, this exposes mothers and their infants to unnecessary health risks (Schuitemaker et al., 1997) with drastic implications on the health system and the economy.

In fact, a growing body of research suggests that high cesarean section rates represent increased probability of negative health consequences for mother and child (Hemminki, 1991; Shearer, 1993) with probable adverse psychosocial impacts on the family (Mutryn, 1993). In addition to these negative health consequences, cesarean childbirths incur higher financial burden than vaginal deliveries(Shearer, 1993; Burns et al., 1995). This creates an economic burden not only on developed countries but more acutely on less developed economies given their everlasting struggle with resources.

In light of these consequences, it would seem that the global trend, toward more cesarean births is in need of thorough scrutiny. In that respect, decision makers have to focus on a wide array of factors charged with the increase in cesarean rates. These can be divided into three categories: maternal, physician and facility related factors.

Maternal characteristics such as age, education and health insurance have been greatly associated with increased rates in cesarean delivery (Burns et al., 1995; Khawaja, Kabakian-Khasholian, & Jurdi, 2004). Furthermore, and from a medical perspective, the likelihood of cesarean delivery increases with multiple gestation (plurality), low birth weight, late babies (gestation of 42 weeks or more), and the number of prior deliveries (parity) (Burns et al., 1995). Additionally, reception of prenatal care is associated with an increase in cesarean sections (Burns et al., 1995).

Apart from the patient related factors, hospital characteristics also appear to be associated with the probability of cesarean section. Several studies have shown that teaching hospitals tend to have lower cesarean rates than non-teaching facilities (Gregory, Ramicone, Chan, & Kahn, 1999).

Physician factors, such as convenience or financial incentives, have been reported to explain variations in cesarean section rates. Some reports have indicated significantly lower cesarean rates on weekends and night shifts (Burns et al., 1995; Spetz, Smith, & Ennis, 2001) to accommodate the schedule of the provider and at times the patient.

Developing countries continue to be challenged in containing the rise in cesarean delivery rates. Most of these countries, and in particular middle income countries such as Lebanon, have better access to hospital care where most of the childbirth occurs under the supervision of reproductive health professional attendants. Lebanon is characterized by a young population, similar to other countries in its region, with 28% under 15 years of age and 8.5 % over 60 (WHO, 2005). Population growth rate is 2.1% with a total fertility rate of 2.2 live births/woman and an infant mortality rate of 28‰ live births (WHO, 2005). While the gross domestic product is that of a middle-

income country estimated by the World Bank in 2003 at $4400 per capita, spending on health is close to 12% of the GDP, a percentage spent by many developed high-income countries. It is estimated that close to 80% of spending on health goes to the private sector (Ammar, Mechbal, & Awar, 1998), most of which is publicly financed. The Ministry of Public Health (MOPH) is the major public financier paying 40% of the bill (the equivalent of $180 million of which 88% goes to reimbursing private hospitals). The Ministry is considered the insurer of last resort and hence tends to pay more for inpatient care. Other public agencies such as social insurance (25%) and public insurance (17%) share the bill, while private insurance and out of pocket contribute to 18% of the health care bill (Ammar et al., 1998; Ammar, Mechbal, & Azzam, 1998). In brief the healthcare system is driven by the private sector, which in turn is prompted by free market economy and profit maximization.

Moreover, it is believed that there is an abundance of health providers, characteristically, from a mosaic background in their training from Eastern and Western Europe, North America, the formerly Soviet States and the Arab region. This would, undoubtedly, affect the practice patterns in the provision of health services and in particular, reproductive health and cesarean deliveries. Available estimates on the rate of cesarean rates range from 18% (Khayat & Campbell, 2000) to over 25% (El-Zein, 1999) and in some unofficial estimates it is registered as over 50%. Not only is the variation alarming but also the rate itself.

The primary purpose of the present study is to elucidate the dramatic variation in cesarean section within Lebanon. More specifically, this study aimed at the following:

1. To examine the association between cesarean rate and non-clinical patient characteristics.

2. To examine the association between cesarean rates and mode of payment of hospital bill, controlling for confounding factors such as age, complication and day of delivery.

3. To examine the association between cesarean rates and provider characteristics.

METHODS

Data collection

Based on a power analysis using an estimation model for difference between binomial parameters (Fleiss, Levin, & Cho Paik, 2003), the study sample comprised 600 women from maternity wards in 10 hospitals in the Lebanese Capital, Beirut. They were randomly selected proportional to the estimated load of deliveries during the period July to October 2000, which accounted for 60% of all deliveries in that period.

The study followed a cross-sectional design where data were collected by direct interviews using a closed-ended questionnaire from all women who gave birth during that period. Permission from the hospital and the surveyed women were secured before commencement. All interviews were conducted within 24 hours post-delivery and by female nurses who were not affiliated with the hospitals under study. The interviewers were trained on administering the questionnaire blinded from the hypotheses of the study.

Measurements

Hospital and physician characteristics and maternal factors (clinical and socio-demographic) were considered as independent variables in the present study. Maternal factors include: age at the time of delivery; occupation (working versus non-working); education level; type of third party payer; site of prenatal care; parity; and

gestational age. Furthermore, the education and occupation of the husband were also included as correlates of socioeconomic status.

Maternal education was categorized into: low, defined as elementary or less; medium, defined as intermediate, secondary, or technical education; and high, defined as university undergraduate or graduate education. Four categories of third party insurance status were identified: uninsured; covered by the Ministry of Public Health (indigent); social insurance; and private insurance. Prenatal care centers were categorized private or public. Additionally, hospitals were classified as teaching versus non-teaching (determined by the presence of a residency program affiliated with a university that has an accredited medical school); and profit versus nonprofit. Physician convenience factors were the day of week and time of the day for delivery. Closely associated with that was whether the patient was informed of the delivery. Patients who underwent a cesarean were asked about the time when the physician informed them that their delivery would be cesarean. Those who reported being informed at least 24 hours prior to delivery were classified as "planned cesarean", otherwise, they were classified as "unplanned cesarean."   The dependent variable was the type of delivery, dichotomously defined as cesarean or vaginal.

Statistical methods:
Chi-Square and mean difference (ANOVA) tests were used for bivariate analysis. Based on reported significance in the literature and/or significance in this study, factors were selected for multivariate analysis. Multiple logistic regression analysis was used to evaluate the independent effect of each factor, controlling for potential confounding variables. The resulting contribution of each factor on the likelihood of cesarean birth was expressed in terms of odds-ratios (OR), using 95%

confidence interval (CI) level. The Hosmer-Lemeshow test was used to assess the overall goodness of fit of the logistic regression model. The dependent variable, type of delivery, was coded as cesarean =1, and vaginal = 0.

RESULTS

Maternal Characteristics

The sample comprised 600 mothers with a mean age of 28.4 (standard deviation ± 5.3) years. Whereas, the majority of women (54.8%) attained medium educational level, 16% of the sample had low educational level and less than 30% had university education. Almost one third of mothers were first-time mothers (primies), and a slightly higher percentage (34%) had 2 or more previous children. Thirteen percent of the sample were not insured, another 13% were covered by the Ministry of Public Health, and the rest (73.5%) were covered by other third party payers; private (32.8%) and social (40.7%) insurance. Almost fifteen percent of mothers received their prenatal care at a public health center, versus 85.2% at private clinics.

Table I summarizes distribution of cesarean rates by socio-demographic characteristics. The aggregate cesarean rate among the participants was 35.2 %. Cesarean rates varied by level of women education. The rate was highest among women with low educational level (42.1%, compared to 31.9% for mothers with medium level of education). However, this inverse correlation did not achieve statistical significance. Mean maternal age also did not differ by type of delivery. Similarly, the correlation between status of maternal employment and type of delivery was not significant. Type of medical insurance emerged as the socio-demographic characteristic most strongly associated with type of delivery. Specifically, a 43.6% cesarean rate was observed among women covered by the Ministry of Public Health, compared to a 27.8% rate among the uninsured.

Table 1. Delivery type by socio-demographic characteristics of delivering women in Beirut July - October 2000

| | Delivery type | | | | |
| | Ceseran Section | | Vaginal Delivery | | |
Variables	N	%	N	%	P-Value
Women Education					
Low	40	42.1	55	57.9	0.14
Medium	105	31.9	224	68.1	
High	66	37.5	110	62.5	
Total	211	35.2	389	64.8	
Women Employment					
Housewife	148	33.8	290	66.2	0.25
Working	63	38.9	99	61.1	
Total	211	35.2	389	64.8	
Husband Education					
low	32	34.8	60	65.2	0.93
medium	107	35.9	191	64.1	
High	72	34.3	138	65.7	
Total	211	35.2	389	64.8	
Husband Employment					
Unemployed	3	30.0	7	70.0	0.98
Manual labor	53	35.3	97	64.7	
Nonmanual skilled	88	35.8	158	64.2	
Professional/Managerial	67	34.5	127	65.5	
Total	211	35.2	389	64.8	
Type of Health Insurance					
No insurance	22	27.8	57	72.2	0.19
MOPH [a]	34	43.6	44	56.4	
Private insurance	72	36.5	125	63.5	
Social insurance	82	33.6	162	66.4	
Total	210	35.1	388	64.9	
Women Age					
Mean(SD)	28.8 (5.7)		28.2 (5.0)		0.232
Range	15-43		17-46		

[a] Ministry of Public Health

For participants with previous cesarean deliveries, the cesarean rate was 91.7%, versus 15.2% for women with

previous vaginal deliveries (Table 2). Neonates of gestational ages between 29 and 36 weeks had 56.8% probability of cesarean birth, compared to 33.4% for babies of gestational ages between 37 and 42 weeks. Among primies, cesarean rates were 43.3%, compared to 34.9% for women with one child, and 27.5% for those with two or more previous children. Babies whose mothers received prenatal care at a private clinic (37.0%) were 50% more likely to be cesarean babies, compared to babies whose mothers received prenatal care at a public health care center (24.7%).

Table 2. Delivery type by medical characteristics of delivering women in Beirut July-Oct 2000

| Variables | Delivery type | | | | |
| | Ceseran Section | | Vaginal Delivery | | |
	N	%	N	%	P-Value
Number of previous children					
None	87	43.3	114	56.7	0.004
One	68	34.9	127	65.1	
Two or more	56	27.5	148	72.5	
Total	211	35.2	389	64.8	
Weeks of gestation					
29-36	25	56.8	19	43.2	0.002
37-42	185	33.4	369	66.6	
Total	210	35.1	388	64.9	
Any of the previous deliveries was ceserean					
Yes	77	91.7	7	8.3	0.000
No	48	15.2	267	84.8	
Total	125	31.3	274	68.7	
Birth weight (grams)					
low -2400	21	47.7	23	52.3	0.07
2400+	190	34.2	366	65.8	
Total	211	35.2	389	64.8	
Place of visit for prenatal care					
Private clinic	189	37.0	322	63.0	0.016
Health center	22	24.7	67	75.3	
Total	211	35.2	389	64.8	

Hospital and physician characteristics

Time, as a convenience factor, was highly associated with the type of delivery (Table 3). Babies born during weekdays were 60% more likely to be delivered by cesarean section compared to babies born during weekends when planned and unplanned deliveries were taken together (38.0% versus 23.5 %). To account for the effect of planned cesarean on timing of the delivery, only unplanned deliveries were taken and cesarean rates were compared again. The probability of a cesarean delivery for babies born during weekdays became 80% higher compared to babies born during weekends (23.6% versus 12.5%). As for hospital teaching status, cesarean rates did not differ between teaching and non-teaching hospitals. Also the difference in cesarean rates was only around 6% when hospitals were compared by ownership status (For profit versus Nonprofit) and did not reach statistical significance.

Table 3. Delivery Type by Hospital and Physician Charcteristics

| Variables | Delivery Type | | | | |
| | Ceseran Section | | Vaginal Delivery | | |
	N	%	N	%	P-Value
Time of Delivery (all deliveries)					
day	141	44.9	173	55.1	0.000
evening	36	25.0	108	75.0	
night	32	23.2	106	76.8	
Total	209	35.1	387	64.9	
Time of Delivery (unplanned deliveries)					
day	53	23.5	173	76.5	0.500
evening	27	20.0	108	80.0	
night	24	18.5	106	81.5	
Total	104	21.2	387	78.8	
Day of Delivery (all deliveries)					
Week days	183	38.0	298	62.0	0.003
Weekend	28	23.5	91	76.5	
Total	211	35.2	389	64.8	
Day of Delivery (unplanned deliveries)					
Week days	92	23.6	298	76.4	0.014
Weekend	13	12.5	91	87.5	
Total	105	21.3	389	78.7	
Hospital Teaching status					
Yes	114	35.8	204	64.2	0.710
No	97	34.4	185	65.6	
Total	211	35.2	389	64.8	
Hospital Ownership					
Not for profit	104	32.2	219	67.8	0.100
Profit	107	38.6	170	61.4	
Total	211	35.2	389	64.8	

Multivariate Analysis

Each one-year increase in maternal age was associated with a significant increase (6.0%) in the odds of having a cesarean (Table 4). As for the link between mother's education and probability of cesarean section, an almost 50.0% decrease accompanied either a middle or high educational level. Parity also had a significant effect on the type of delivery. As parity among respondents increased by one child, the odds of cesarean section decreased by 35.0%. Furthermore, for every one-week increase in gestational age, the probability of a woman delivering by cesarean section decreased by 24.0%. The effects of insurance status and prenatal care site on cesarean section were very powerful. Women covered by the Ministry of Public Health were 2.4 times more likely to deliver by cesarean section, compared to uninsured women. If a woman received prenatal care in a private maternal health center, she was two-times more likely to undergo cesarean section, compared to a woman receiving prenatal care in a public health center. Babies born during weekdays were 2.2 times more likely to be delivered by cesarean section, compared to those born during weekends. Hospital characteristics, whether classified by ownership or teaching status, had no statistically significant effect on the type of delivery.

Table 4. Determinants of Cesarean Delivery (Odds Ratios From Logistic Regression Models) for Women Giving Birth at 10 Hospitals in Beirut Area; July - October 2000

Giving Birth By Cesarean Delivery			
	P-Value	Odds Ratio	95% CI
Age[a]	0.004	1.060	(1.019 - 1.103)
Parity[a]	0.000	0.650	(0.539 - 0.783)
Gestational age[a]	0.000	0.758	(0.569 - 0.871)
Birth weight	0.115	1.000	(1.000 - 1.001)
Women eduction (Low)[b]			
Medium	0.005	0.451	(0.258 - 0.788)
High	0.030	0.488	(0.255 - 0.935)
Third party payer (Not insured)			
Ministry of Public Health	0.024	2.356	(1.119 - 4.959)
Private insurance	0.912	1.030	(0.540 - 1.995)
Social insurance	0.717	1.122	(0.602 - 2.091)
Place of prenatal care (Public)			
Private	0.022	2.146	(1.116 - 4.126)
Hospital ownership (Not for profit)			
For profit	0.157	1.317	(0.899 - 1.93)
Time convenience (weekends)			
Weekdays[a]	0.002	2.205	(1.353 - 3.593)

a P values < 0.005
b Categories and values between parenthesis serve as baseline reference in interpreting the Odds ratios

DISCUSSION

This study investigated the provision of cesarean section deliveries in the city of Beirut, Lebanon. The observed cesarean rate of 35% is higher than that reported in studies on Lebanon (Khayat et al., 2000) and the Mediterranean region (Khawaja, Jurdi, & Kabakian-Khasholian, 2004; Hindawi & Meri, 2004) but similar to reported trends in Turkey (Elter, Ay, & Erenus, 2003) and Latin America(Gomes, Silva, Bettiol, & Barbieri, 1999). As expected, the leading factors for such a high rate include previous cesarean delivery, gestational age, parity, and private prenatal care. Furthermore, the rate for a repeated cesarean is close to 92% which, though alarming but not surprising (Menacker, 2005). However, what was alarming is the cesarean rate of 43% among primies which could be attributed to the anticipated sense of fear, pain and stress associated with vaginal deliveries which makes an elective cesarean a better option (Kabakian-Khasholian, Campbell, Shediac-Rizkallah, & Ghorayeb, 2000; Chaaya et al., 2002). Furthermore, cesarean rates were higher for women who received care at private rather than public care centers (37% vs. 25%, respectively). One plausible explanation could be related to better financial returns on cesarean deliveries as opposed to vaginal deliveries. Another explanation could be the socioeconomic status of the women. In this study, women who sought private services tended to be more affluent. Out of fear of a vaginal delivery and concern for substandard care, they might have opted for a cesarean section, which is congruent with some international experiences (Behague, Victora, & Barros, 2002).

Non-clinical factors, including demographic characteristics of the patient, had a considerable impact on cesarean rates. Some of these showed significance in the multivariate analysis including the educational level of the

woman, and the number of previous children. Literature on the association between maternal age, educational level and parity with cesarean delivery is abound(Abu-Heija, Jallad, & Abukteish, 1999; Khawaja et al., 2004). For that, awareness and health educational programs need to focus on educating the mothers, particularly new mothers, on appropriate delivery types given their health and condition specific status. Such programs need also to encourage mothers to inquire more about their condition and the need for cesarean section. It is understandable that at times the woman herself might prefer to elect cesarean section. Nevertheless, mothers need to be fully aware of the risks associated with cesarean and should take responsibility upon such decisions given their implications on their health and the outcomes of delivery. Furthermore, logistic regression showed that insurance coverage by the Ministry of Public Health had the greatest impact on the likelihood of cesarean delivery, compared to uninsured women. This is congruent with previous research suggesting that uninsured women are less likely to have cesarean section, compared to insured women (Onion, Meyer, Wennberg, & Soule, 1999). Given this empirical data, the government should re-examine its audit and feedback protocols to identify the appropriate indications for such a greater rate, and to disseminate the information to auditors and physicians. This could be instituted as part of a continuing education program and the implementation of explicit practice guidelines.

On the other hand, the prenatal care site is also a key factor, as women receiving such care in a private clinic are more prone to cesarean deliveries than their public center counterparts. This particular finding might reflect the economic incentive inherent in the private sector, as each additional cesarean delivery (whether or not medically indicated) generates greater private revenues. Previous research (Tussing & Wojtowycz, 1992) reported similar

results indicating an upward movement in the demand curve as a function of a higher ratio of cesarean delivery fees to vaginal delivery fees. Therefore, if effective prevention of unnecessary cesareans is an institutional (and larger, societal) goal, hospitals need to modify the influence of contingent financial gain on physician behavior. In this regard, hospitals should increase efforts to develop and implement rigorous protocols regarding obstetric services(Myers & Gleicher, 1993; Gregory, Hackmeyer, Gold, Johnson, & Platt, 1999). Furthermore, future research needs to examine the impact of financial incentives on physician behavior and compliance with protocols. This would help hospitals modify their incentive schemes to encourage adherence to practice guidelines. Finally, as inordinate cesarean section rates constitute a serious public health problem (in Lebanon and elsewhere), it is incumbent upon those government agencies with oversight responsibility to ensure its control, and eventual elimination. Accordingly, these agencies should call for a wide spectrum debate and consensus building on cesarean section practices to ensure process improvement leading to better outcomes in maternity settings. Furthermore, additional research is needed to better understand the impact of factors favoring cesarean deliveries especially the women's social and personal constructs and their impact on the demand for elective cesarean deliveries.

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