

*Full Length Research Paper*

# A study of Caesarian Sections in Cyprus: The direct and indirect costs of scheduled caesarian sections among pregnant women

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The increase in the number of Caesarian Sections is an important public health issue both in terms of health and economic effects. Our aim was to illustrate their actual financial cost and to determine their frequency. The study was done in a public hospital. We measured the direct and indirect costs of scheduled caesarian sections among a convenience sample of 13 pregnant women in August 2013, using micro-costing “bottom-up” approach. This included salaries, pharmaceuticals, consumables, laboratory tests as well as the indirect cost of supporting services. For each patient a separate sheet was created. The hospital stay was on average 7 days. We performed a quantitative analysis and processed the data using the program Microsoft Excel. According to the findings, the financial cost amounted to €2,654.60 on average. The research revealed an increase in the caesarians from 4.11% in 1980 rose to 40.07% in 2012 with a total cost at about 14 million (2.5%) of the health budget. These finding will help informed decisions on introducing policies for the diminishing of the caesarian sections in the country

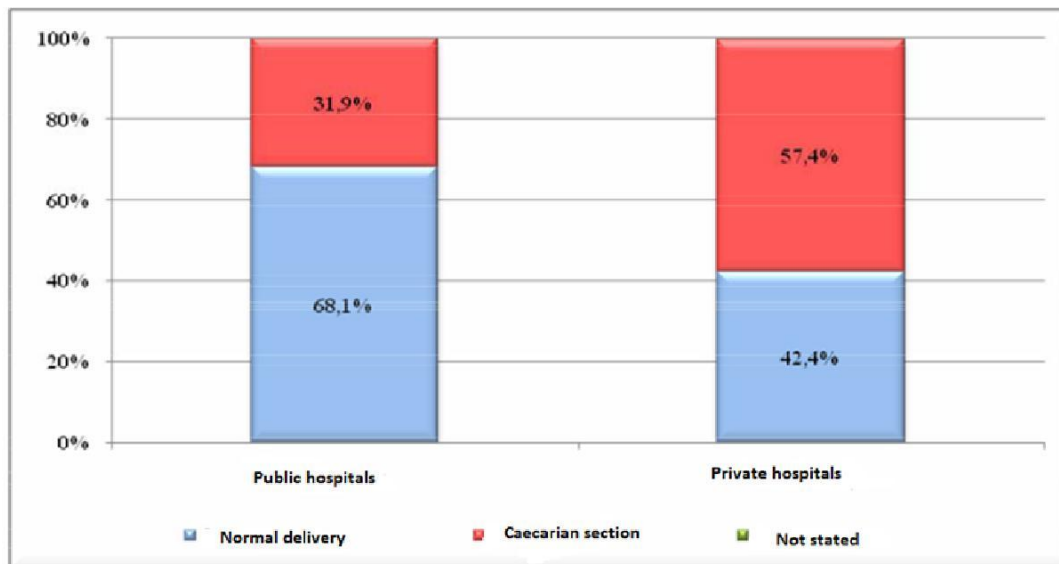
**Keywords:** Caesarean section, rates, trends, financial cost, Cyprus

## INTRODUCTION

The performance of a Caesarean section (CS) is very important when it is done to save the life of the mother or the baby. It is considered the best way of treatment in high risk pregnancies such as obstructed labor, fetal distress, placenta praevia, malpresentations, multiple gestations and a previous CS. Furthermore, “postdate pregnancy”, macrosomia and elective induction may indicate a CS (Alran et al., 2002; Unnikrishnan et al., 2010). In recent years, there has been a continuous global increase in rates of Caesarean Section (CS), thus creating a huge problem in Health Systems (HS) of the country after increasing the risks concerning the delivery for the mother and the infant (Lilfond et al., 1990; Shuitemaker et al., 1997; Hall and Bewley, 1999; Palasma et al., 2010; van Dilen et al., 2010) while the charges of the health budget of the countries become larger. It has been estimated that the CS costs from two to four times more than the Normal Deliveries (ND) (Truven Health Analytics, 2013).

Several studies have reported a continuous increase in the number of CSs especially in developed countries (OECD, 2013), for instance in UK from a percentage of 8% that was 30 years ago, it amounted to 21% in 2001 (Torloni et al., 2011; Wang et al., 2013) while in the USA it was amounted to 32.8% in 2012 (Francome and Savage, 1993; US National Center for Health Statistics, 2014).

In Greece there are no official reports that show the percentages of CSs in relation to the NDs. But according to Tampakoudis et al., (2003), the average frequency of CS was increasing steadily, and from 13.8% during the years 1977 to 1983, it was amounted to 29.9% between 1994–2000. The National Study on Breastfeeding by Gaki et al., (2009) showed that half of births in the country were with CS (CS 49.4%, ND 50.6%). Births that took place in private maternity hospitals were slightly more than those taking place in public 53.9% and 46.1% respectively, while the percentage of CS was higher in

**Figure1.** Mode of delivery and percentage distribution of births in Public / Private Sector, 2011

Source. Cystat, 2012

private hospitals and increased considerably over the last 10 years (Mantalenakis and Bontis, 2004; Mosialos et al., 2005).

In our country, a study by the Ministry of Health found that in 2011, three in 10 births were by CS in the public sector while in the private sector the rate was double, 6 in 10 births were by CS and moreover the study showed that Cyprus had one of the highest rates in the CS compared with other developed countries (Ministry of Health, 2012).

According to WHO (1985), the percentage of CS should not exceed 10-15% of all births in each country (Lauer et al., 2010), while most countries had rates over 20% in the same year. The CS as a surgical method of childbirth, compared to a ND, poses more risks for both the mother and the infant (American College of Obstetricians and Gynecologists and Society for Maternal-Fetal Medicine, 2014).

The reasons for the continuous increase of CS is attributed to commercialization of deliveries by obstetricians gynecologists, as well as to the methods of compensation from insurance companies (Mosialos et al., 2005), and in addition modern electronic fetal monitoring during childbirth and early diagnosis of fetal distress have been implicated. Furthermore other factors play a vital role such as improved techniques which lower maternal and neonatal mortality and morbidity, the increase in the survival rate of prematurity after CS, the fear of doctors for criminal prosecution in the event of accidents or complications during a problematic normal delivery and the desire of women to choose the CS to lay their child (WHO, 1985; Bost, 2003; Lauer et al., 2010, Antsaklis, 2011).

It is known that the CS has a higher cost than the ND

and contributes to the increase in health expenditure in the budget of the country and it is due to both the higher cost of CS compared with the ND, and the increased frequency with which the CS is conducted. In the USA the cost of the CS is almost twice that of ND and significantly raises the relative economic burden (Shearer, 1993; Taffel, 1994; Petrou and Glazener, 2002).

Fawsitt et al. (2013) conducted a research in Ireland relating to the pricing of a ND with a history of prior to a ND and a planned CS. As expected, the CS cost almost three times more than the ND, (€ 1,637.09 versus € 627.94 respectively). Moreover women (with CB) were attended during the six postpartum weeks to illustrate from the cost-effectiveness analysis, the impact and results of these operations as regards morbidity and mortality. The results showed that women with CS were hospitalized for more days, had increased chances of complications and it took longer to recover (Petrou and Glazener, 2002). All the above necessitate individual assessment of each woman who is giving birth and the right decision for the mother, the fetus, the economic and social environment.

### Significance of the study

The increase in the number of CSs is an important public health issue with potential effects on the health of the mother and the newborn, while the continuous increase was attributed to iatrogenic factors, leads to an excessive burden on the health budgets of countries, insurance funds and households, increasing private payments (out-of-pocket-money). A recent study of Cystat (2012) showed that women choose to give birth in private hospit-

**Table 1.** Time trends of normal deliveries and caesarean sections in the maternity clinic of Larnaca Hospital during the years 1980-2012

Year	Total number of births	Normal deliveries	Caesarian sections	% caesarian sections
1980	948	909	39	4,11
1981	920	868	52	5,65
1982	788	741	47	5,96
1983	707	652	55	7,78
1984	614	558	56	9,12
1985	586	518	68	11,60
1986	506	432	74	14,62
1987	474	423	51	10,76
1988	486	440	46	9,47
1989	394	351	43	10,91
1990	416	368	48	11,54
1991	362	327	35	9,67
1992	439	393	46	10,48
1993	351	287	64	18,23
1994	428	355	73	17,06
1995	401	330	71	17,71
1996	381	313	68	17,85
1997	378	305	73	19,31
1998	406	315	91	22,41
1999	443	335	108	24,38
2000	494	396	98	19,84
2001	481	379	102	21,21
2002	372	279	93	25,00
2003	310	248	62	20,00
2004	354	262	92	25,99
2005	417	323	94	22,54
2006	421	323	98	23,28
2007	380	290	90	23,68
2008	332	245	87	26,20
2009	432	287	145	33,56
2010	491	301	190	38,70
2011	506	333	173	34,19
2012	534	320	214	40,07

Source: Patient records. Maternity clinic of Larnaka Hospital, 2013

als and has increased the percentage of CS in particular in the private sector (Figure 1). Combined with the economic crisis in our country and in order to avoid problems of sustainability of the health system it is appropriate to restrain spending budget and is imperative to seek effective ways of diagnosis and personalized treatment of patients. On this issue there is very limited research in our country, and thus our purpose was to investigate the economic costs of caesarean section for the health care system of Cyprus, while an individual objective was to study whether the number of CSs has increased, compared with normal deliveries.

Specifically, 65% of all births took place in private maternity hospitals and 35% in public maternity units. This may be so, due to private insurance and the prosperity that characterized the life of Cypriots that is their ability to make private payments until 2011, i.e. before falling into a period of economic crisis. This may

be changed due to the economic crisis affecting the country but is beyond the scope of this work.

#### Time trends of caesarean sections

As part of monitoring the evolution of total births throughout the years, as well as the CSs in the maternity hospital of Larnaca, deliveries were counted from 1980 to 2012 using birth records kept in the clinic. From the data, it appeared that the CS, in the last five years, hold 34.54% of all births, while in the period from 1980 to 1984 the percentage of CS was 7.36% on average (Table 1).

The investigation showed that the trend in the frequency of CS, as expected was increasing. Specifically, in 1980 the CS represented only 4.11% of all births, while in 2012 the figure rose more than 10 times and amounted to 40.07%, posting very strong growth particularly in the last four years.

**Table 2.** Average total cost of CS, in the obstetric clinic of the hospital, in 2013

Types of Cost	Amount in Euros
Salaries	1,055.11
Medication	89.15
Supplies	49.05
Laboratory and other tests	672.00
Cost of surgery (25%)	263.78
Anesthesiologists' cost (10%)	105.51
Support (20%)	420,00
<b>Total</b>	<b>2,654.60</b>

The above process of costing the CS in a public hospital in Cyprus showed that each CS costs on average **€2,654.60**.

### Economic Cost of the caesarean section in a public hospital in Cyprus

#### MATERIAL AND METHOD

The study was descriptive and a convenience sample in obstetrics clinic of Larnaca's General Hospital, was used. The hospital operates 169 beds. The obstetric - gynecological clinic operates 24 beds, staffed by four obstetricians-gynecologists, twenty-six nurses - midwives, three nurse assistants, three maids and an office clerk. There is continuous collaboration between paediatricians attending newborns on a daily basis and anesthetists providing anesthesia in the parturient who will have a CS. The last five years 2008-2012 occurred on average 460 births per year, of which 162 are CS.

#### Collection of data

The survey was conducted in August 2013. The study sample consisted of 13 scheduled surgeries of CSs performed with epidural anesthesia. The reasons for this planning was a previous CS (6 cases), elective induction (3 cases), postdate pregnancy (2 cases), breech presentation (1 case) multiple pregnancy (1 case). The data for the scheduled CSs were collected from the records of the obstetric clinic. The calculation of costs included the calculation of the staff's salary, drugs, supplies, and laboratory and other tests (Table 2).

The collection of the data for the costs was made by the General Accounting Office for staff salaries. Because CS was planned and conducted during the working hours were not included overtime wages. From the Financial unit of the hospital was received the information on pricing of laboratory examinations, and the cost of consumables, while from the pharmacy the cost of drugs used. The cost included the cost of surgery 25% and also 10% of the anesthesiologist, as a ratio to the above fees of staff in accordance with the official pricing of the Ministry of Health (2012) for the CS. Moreover indirectly, was calculated as 20% the support costs (accommodation, food, clothing) and miscellaneous

expenses (administrative expenses). The hospital stay was in average 7 days.

#### Tools

For each of the CSs, a separate sheet was created, which included supplies, medicines and laboratory tests. Detailed recording of all financial parameters which included the costing of CS was conducted.

#### Ethical

This study was conducted after approval by the Ministry of Health, the National Bioethics Commission, the Privacy Commissioner and the Administration of the Hospital. The anonymity of patients was kept and nowhere was mentioned any personal data.

#### Statistical analysis

There was conducted quantitative analysis and processing of data using the program Microsoft Excel.

#### RESULTS

Table 2 showed the average cost of the CS in obstetrics clinic of the hospital Generally, even though it is accepted that the CS should be made when the mother's and the newborn life is threatened, the number of CS increases in all countries of the world for various reasons (Hage et al., 1992; Francome and Savage, 1993; Di Maio, 2002; Bost, 2003). Although most of the time the CS is scheduled to face hazards that threaten the life of the mother or newborn, complications that may occur are many, raising the average duration of hospitalization, the consumption of drugs and performing additional tests and possibly surgery (Pallasmaa et al., 2010; van Dillen et al., 2010; Barber et al., 2011; Koechlin et al., 2010). But it must be emphasized that the complications of a planned CS are less than an emergency one.

Because the rate of the frequency of CS is rising both in our country and in other countries of the European

Union and the United States, measures should be taken to reduce the number of CS (Churchill and Francome, 2009). Elective induction is acceptable in our country, in that respect over the last five years, the average CS in public maternity hospitals has exceeded 39%, while in private they exceeded 59% (Ministry of Health, 2012). It is necessary to assess the opinion of parturient women, before they make a decision, so that the CS can be carried out only when there is a real medical indication.

The process of micro-costing followed in the present study known as "bottom-up approach" (Morris et al., 2007), depends largely on the particular circumstances of each hospital in the organization and provision of services, particularly in regarding staffing and staff salaries (Grobman et al., 2000; Chung et al., 2001; Kazandjian et al., 2006). Hospitals with fewer staff will have fewer expenses and less variable costs of hospitalization, and possibly there may be differences as concerns the average duration of hospitalization, between public hospitals, as well as between them and the private ones. Therefore, this cannot be regarded as representative, but it is a good indication of the cost of this specific surgical method in our country. As for drugs and laboratory tests, there were no differences between patients.

This research has highlighted the economic cost of the CS in a public hospital in Cyprus, which amounted to € 2,654.60 in 2013, and was three times higher than the cost of a normal childbirth. This figure was similar to the revised pricing of the Ministry of Health (MoH) 2,612.00, which is valid in the country since August 2013. In particular, in August 2013 the Ministry of Health announced new pricing for the CS amounted to € 2,612.00, while the previous pricing of the Ministry of Health (before that date) was 30% lower and amounted to € 783. The difference from the previous value was  $2,612.00 - 783 = 1,869.00$  €. This resulted in the creation of budget deficits in public hospitals or increased user's participation in the expenses of services. Considering the results of this study and the pricing of the Ministry of Health we found out that the results are mutually compatible.

If we calculate the cost of the same year for CSs, which amounted to 5200 in total, paid by the social security, the state budget through the Ministry of Health and out-of-pocket money through private payments, there comes in light an expenditure of 13,803,920 €. If we take into account that due to the economic crisis, the budget of the health sector decreased by 10% to around € 560 million, this represents (2.5%) of the health budget making important to achieve cost containment and perform caesarean only if it is medically justified, aiming at lowering the burden of the health care system and the family budget.

## CONCLUSION

The investigation revealed, however the increasing trend

in the frequency of CS compared with ND in Cyprus. The entirely alarming rate of 56% occupied by CSs in total births, particularly in the private sector of our country is a threat to the Health System and the health of the mother and the newborn. Furthermore, according the current research findings the CS costs three times more than the ND. This leads to the indebtedness of the Health System, and simultaneously, it creates problems in financial management.

Increased costs pose a serious problem of the existence of the Health System. Further development of the electronic patient records, the introduction of DRGs and coding of services, is expected to help towards the control of health expenditure.

These efforts, however, reduce the rate of CS and hence the costs resulting to the Health System must be consistent with efforts to safeguard the antenatal health. The primary goal of each and every professional involved in obstetrics should be to minimize maternal, fetal and neonatal morbidity and mortality.

The need to conduct similar investigations which will deal with the costing of the CS and the ND at all hospitals in the country, are expected to show more clearly the difference between the actual economic cost of the CS and the ND and will complete the transparency of the causes leading to increased costs for the Health System.

Also research, which will deal with the reasons that lead to conduct so many CSs in our country, will help the competent bodies to adopt new practices that aim to better control and thus reduce the rate which will approach as much as possible to 15% set by the WHO

The results of the costing of CS, especially if they are combined with similar studies in other hospitals, could help the managers and the Ministry of Health to exercise appropriate policies to reduce CSs. Also the results of this research could be used in conjunction with other economic studies on postpartum care and newborn after CS, for the evaluation of health services. The results of these will provide useful information for hospitalization, morbidity and mortality of mother and newborn.

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