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Caesarean sections in Mexico: are there too many?

GUILLERMO J GONZALEZ-PEREZ, MARIA G VEGA-LOPEZ, CARLOS CABRERA-PIVARAL, ARMANDO MUÑOZ AND ANA VALLE
Centre for Health, Population and Human Development Studies, University of Guadalajara, Mexico

This paper seeks to quantify the magnitude of caesarean sections in Mexican public health-care institutions in recent years, to characterize the evolution of caesarean section rates (CSR) during the last decade, and to estimate the possible economic cost caused by the excess of caesareans performed in these institutions. The study is based on data obtained from the health sector, both for Mexico in the 5-year period 1993–97 and for the Mexican State of Jalisco between 1983 and 1998. Linear regression analysis was used to evaluate time series, and 'excess of caesareans' was considered the number of caesarean deliveries performed above the admissible 15% CSR. The results reflect that on the national level, more than one-quarter of the deliveries handled by public institutions ended in caesarean section for each analyzed year, and if the deliveries performed in private institutions are included, the national rate is around 30%. A marked increase in CSR can be observed in Jalisco between 1983 and 1998 (almost 50%); and the cost for the nation of this CSR excess in financial terms is highly significant: several millions of dollars – obtained from public funds – are spent annually and unnecessarily by health services. The findings suggest that the increase in CSR is a public health problem that has not been satisfactorily faced by the health sector authorities. Many unnecessary caesareans would undoubtedly be avoided if the policies of these public health-care institutions were to consider, as a priority, both the known higher risk implicit in a caesarean for the health of the mother and child, and the economic impact on the country and its health institutions of the excessive number of caesareans performed yearly.

Introduction

The caesarean section is an operation conceived originally as a last resort to alleviate maternal or foetal conditions when there are risks posed to the mother, the foetus or both in the delivery stage. In recent decades, however, caesarean section practice has spread notably on the world level, thanks to the availability of powerful antibiotics and the development of modern surgical techniques.[1] This increase has occurred in spite of the potential complications that such a procedure implies for the health of the mother and the neonate.[1,2] Various authors agree when affirming that, along with purely clinical aspects, other reasons of a socio-cultural and economic character, or those related to medical practice, play a substantial role in explaining the high caesarean section rates (CSR) that have appeared during recent decades in many nations.[3,4]

In the mid-1980s, the World Health Organization (WHO) warned about the inadequate use of technology for childbirth, and it stated that a CSR higher than 10–15% is unjustified, for whatever reason, in any region or country.[5] During this period, many nations showed CSR well above 20%.[5] Since the 1980s, while the CSR in developed countries such as Canada and the United States seems to have finally stabilized at around 20–25%,[6–8] and other countries, such as the Netherlands, England and Norway[6,8,9] show much lower rates, in some Latin American countries the CSR has either stabilized at very high level (as appears to be the case in Brazil[2,10]) or continues to increase, reaching relatively high rates.[11,12] Mexico has not been exempt from this rise[13–15] which seems to occur as much in private as in public health-care institutions.

This work seeks to quantify the magnitude of caesarean sections in Mexican public health-care institutions in recent years, to characterize the evolution of CSR during the last decade and to estimate the possible economic cost caused by the excess of caesareans performed in these institutions.

Data sources and methods

The study is based on secondary data (births according to type of delivery per health institution) obtained from the National Institute of Statistics, Geography and Computation (INEGI, its acronym in Spanish) and of the health sector, both for Mexico in the 5-year period 1993–97, and for the State of Jalisco between 1983 and 1998 (see Tables 1 and 2). The CSR were calculated as the percentage of total hospital deliveries in which this surgical procedure was used. This calculation was performed for each of the three major health institutions in Mexico, which altogether handle more than 80% of the births that occur in the health sector at the national level.[16] These institutions are:

- The Mexican Institute of Social Security (IMSS, its acronym in Spanish), an institution that offers health services and social security to people with stable employment (e.g. industrial and service workers, employees) and their families. The institution's budget is provided by the government, employers and workers.

- The Social Security Institute Serving State Workers (ISSSTE, its acronym in Spanish), an institution that offers health services to government officials – essentially bureaucrats – in different federal agencies and to their families. Among the population receiving these services, teachers stand out because of their large number. ISSSTE's budget is provided by the government and the workers.
- The Ministry of Health (SS, its acronym in Spanish), which offers medical services to the population that does not have access to Mexico's social security institutions, and who, by and large, lack the resources to receive private medical care. Thus, the institution's budget is wholly provided by the government.

The State of Jalisco had nearly 6 million inhabitants in 1995, whose behaviour in terms of health resembles the national average. For example, in 1995 the life expectancy at birth in Jalisco was 73.4 years while in all Mexico it was 73 years; infant mortality rates were 27.3 and 27.8 per 1000 live births, respectively.[17] It was included in the study in order to construct time series which would make it possible to perform a trend's analysis, something that is not possible to do with national data. In the first place, the CSR was estimated for each institution. Then, a simple linear regression analysis was performed, taking the CSR for each institution as the dependent variable and time (measured in years) as the independent variable, to evaluate the increase in CSR in the period analyzed. The Durbin-Watson test statistic (d) was used to test for auto-correlation in the analyzed series. Also, the relative growth of the rates during the period studied, according to institution, was calculated through the formula:

$$\frac{\text{final CSR} - \text{initial CSR}}{\text{initial CSR}} \times 100$$

The 1996 costs for natural and caesarean deliveries at the studied institutions (from only IMSS[i] and ISSSTE[ii] – unfortunately the SS does not handle this information) were ascertained as: at IMSS, 2828 Mexican pesos (US$377 – at 1996 exchange rate of 7.50 pesos per dollar, approximately) and 3220 Mexican pesos (US$429.33), respectively;[18] at ISSSTE, 825 Mexican pesos (US$110) and 2750 Mexican pesos (US$366.66), respectively.[19] As WHO considers caesarean rates over 15% to be excessive, the excess numbers of caesarean deliveries according to institution were identified – that is, the number of caesarean sections performed above the admissible 15%. The additional cost that this procedure represented was calculated with the aim of estimating the economic cost represented by this excess for the institution and for the country: for the IMSS it was US$52.33 in each case; for the ISSSTE, US$256.66.[iii]

Results

When evaluating the number of caesarean deliveries performed at these health institutions at the national level (Table 1), the increase of these rates – already high – in all the public institutions analyzed between 1993 and 1997 is evident. The high percentage of caesareans performed at the ISSSTE is practically the same as the rate observed for private hospitals in Mexico between 1994 and 1997. At the IMSS, approximately one out of every three deliveries ends in a caesarean section for each year of the 5-year period, while in the SS, the institution with the lowest rates, one out of every five deliveries is by caesarean section.

At the national level, more than one-quarter of the deliveries handled by public institutions ends in caesarean section for each year of the period (around 30% in 1996 and 1997), and if the deliveries performed in private institutions are factored in, the national rate would be higher than 30% for each of the last 3 years analyzed. In absolute terms, the information reveals that in the mid-1990s, more than half a million caesarean sections were performed annually in Mexico, of which more than four-fifths were conducted in public health-care institutions.

By analyzing the evolution of CSR, a marked increase can be

Table 1. Caesarean section rates per health institution, Mexico, 1993–97

	Caesarean section rate per year									
	1993		1994		1995		1996		1997	
	n	%	n	%	n	%	n	%	n	%
Public institutions										
IMSS	233 871	31.5	241 267	32.3	236 213	33.5	229 551	34.6	231 616	35.2
ISSSTE	30 047	40.6	30 966	41.7	31 846	43.9	31 352	45.6	30 500	48.1
SS	84 820	19.6	90 906	20.6	103 427	21.7	107 725	23.0	134 865	24.2
Others	44 953	20.1	58 687	21.7	60 340	23.5	58 825	19.9	38 360	22.6
Subtotal	393 691	26.7	421 826	27.5	431 826	28.6	427 453	29.3	435 341	30.1
Private institutions	n.a.	–	91 926	42.4	98 926	45.2	107 330	45.7	124 443	48.1
Total	n.a.	–	513 752	29.3	530 752	30.7	534 783	31.6	559 784	32.8

n.a., data not available.
Source: INEGI. Información Estadística del Sector Salud y Seguridad Social. Cuaderno Núm. 12, 13 & 14, Aguascalientes, 1996, 1997 & 1998; INEGI. Servicios Médicos en Establecimientos Particulares 1994. Serie Boletín de Estadísticas Continuas Demográficas y Sociales, Año I, Núm. 1, Aguascalientes, 1996; SS. Boletín de Información Estadística No. 17, Vol. I, 1997.

Table 2. Caesarean section rates, coefficient of regression (β), statistical significance (p), Durbin-Watson test statistic (d) and relative increase per health institution, State of Jalisco, Mexico, 1983–98

Year	Caesarean section rate per institution					
	IMSS[a]		ISSSTE[b]		SS[c–e]	
	n	%	n	%	n	%
1983	9809	17.9	293	17.4	n.a.	–
1984	10 347	18.6	232	17.5	n.a.	–
1985	11 306	20.0	448	30.1	n.a.	–
1986	11 274	20.1	436	29.9	n.a.	–
1987	12 572	21.6	460	31.9	n.a.	–
1988	13 211	22.2	450	31.7	2645	16.3
1989	13 695	23.2	432	29.2	3909	20.8
1990	15 716	25.5	428	29.2	4406	20.8
1991	16 957	26.9	599	36.9	4986	21.9
1992	17 878	28.6	586	37.9	6414	23.7
1993	18 357	29.7	529	35.6	6654	23.3
1994	19 068	30.7	587	38.2	6967	23.6
1995	19 003	32.9	639	39.0	7067	24.2
1996	18 198	33.2	630	47.1	6091	23.9
1997	19 174	34.9	716	39.7	6513	23.7
1998	19 090	34.8	787	45.3	6555	23.7
n (years)	16		16		11	
β	1.242		1.579		0.567	
β 95% CI	1.162–1.322		1.155–2.002		0.246–0.889	
p	$< 10^{-6}$		0.000001		0.003138	
d	1.1297		1.8486		1.0147	
Relative increase (%) 1983–98	94.4		160.3		45.4	

n.a., data not available.
The following regression was estimated for each institution:

CSR in year t = a + bx + e where x = time

Sources: [a] IMSS, Coordinación de Planeación e Información Médica. Sistema Único de Información. Delegación Jalisco, 1999. [b] ISSSTE, Departamento de Medicina Preventiva. Delegación Jalisco, 1999. [c] SS, Coordinación de Hospitales. Memoria Estadística, Asistencia Materno-Infantil 1988–94. Secretaría de Salud Jalisco, 1995. [d] SS, Dirección General de Planeación. Departamento de Estadísticas. Coordinación de Procesamiento a la Información. Secretaría de Salud Jalisco, 1997. [e] SS, Estadísticas en Salud. Boletín Mensual Población Abierta. No. 1, Octubre, 1999.

observed between 1983 and 1998 in the main public health-care institutions of Jalisco (Table 2). In all the cases, the regression coefficient (β) is positive (the same as the lower limit of the 95% confidence interval) and significantly different from zero. β represents the effect on the CSR of a one-year increase in time, therefore β can be interpreted as the annual growth rate of the CSR in the analyzed period. In all cases, the reported Durbin-Watson statistic was higher than the upper critical value[20] (1.09 for n = 16, 1.01 for n = 11, for a 1% significance level); therefore, there is no evidence of autocorrelation. This finding supports the idea previously expressed that the time trend, in each case, is significantly different from zero.

Thus, it is evident that the greatest proportional increase is observed for the ISSSTE (1.58 percentage points per year) and the lowest in SS (only 0.57). In relative terms, between 1983 and 1998 the CSR increased 160% in the ISSSTE, almost doubled in the IMSS, and grew by 45.4% in the SS.

Further, it is worth pointing out that the CSR for the IMSS was constantly increasing with respect to the previous year (except in 1998, although the decrease was minimal). This is in contrast with ISSSTE where for 5 years (non-consecutive) the rate descended with respect to the previous year (although this reduction was generally small). For 3 years the rate at SS was lower than the previous year, but the decrease observed was minimal.

Finally, Table 3 reveals the excess number of caesareans performed by the public health-care institutions in 1996 (185 568), and their economic significance. For the IMSS, an institution in which the figure of excess caesareans clearly surpasses the admissible number, the cost of this excess in financial terms is notable: US$6 805 674. For the ISSSTE, the figure is also high, at US$5 399 100. Thus, the total cost of excessive caesarean sections for public health-care institutions is US$12 204 774, a conservative estimate if it is considered that SS is not included in the analysis.

Table 3. Excess of caesarean sections and its economic cost (in US$), by health institutions, Mexico 1996

	Health institutions			
	IMSS	ISSSTE	SS	Total
No. of recommended caesarean sections (15% of deliveries)	99 498	10 316	70 246	180 060
Excess of caesarean sections (over 15% of deliveries)	130 053	21 036	34 479	185 568
Economic cost (in US$)[a]	6 805 674[b]	5 399 100[c]	n.a.	12 204 774

[a] Cost (not price or charges) was used to estimate the cost of excess caesarian sections. The cost does not include hospitalization days.
[b] US$52.33 is the difference in the cost between a natural and a caesarean delivery at IMSS.
[c] US$256.66 is the difference in the cost between a natural and a caesarean delivery at ISSSTE.
n.a., data not available.

Discussion

Unfortunately, the Mexican statistics on delivery services provided by public health-care institutions do not make it possible to construct time series of CSR on the national level (perhaps with the exception of IMSS[15]). The information published during the 1980s and the early 1990s only distinguished between eutocia and dystocia, without identifying caesarean sections; nor do the statistics offer data about the care provided in private hospitals or clinics. This situation, which appears to be remedied at present, means it is only possible to analyze the national level for the years 1993–97.

However, at the state level (in this case, Jalisco) the existence of statistical reports made it possible to reconstruct time series since the early 1980s, and to document that: (1) from the beginning of this decade, the CSR in various health institutions clearly exceeded the values considered acceptable by the WHO; and (2) the, already high, CSR underwent dramatic growth in all public health-care institutions, in stark contradiction with WHO recommendations which aim at reducing this practice. In this context, the CSR is almost constantly increasing at IMSS – compared with ISSSTE and SS – and seems to reflect such a statistic regularity (the number of deliveries at IMSS duplicates the deliveries at ISSSTE and SS) as an obstetric practice at IMSS. There, residents and medical students have been playing a growing role, and the proportion of caesarean sections scheduled from the beginning of the pregnancy is on the rise.

Even if the level and evolution of CSR in Jalisco are not a perfect reflection of what has happened in the whole country, it would still not be far-fetched to affirm that CSR have undergone a significant increase since the last decade, in spite of starting at relatively high levels – placing Mexico, in accordance with available information for the 5-year period 1993–97, among the countries with the highest CSR in the world currently. The number of caesareans performed in public health-care institutions is so high that it is, definitely, the most frequently performed surgical procedure and the number one reason for hospitalizations in Mexico.[15]

However, it is necessary to point out that important differences exist among the public health-care institutions, as much in the level of the CSR as in its growth rate: social security institutions (IMSS, ISSSTE) present higher CSR than those observed in the SS, and furthermore, their rates have grown quicker. The fact that the SS (the institution providing health services to the poorest population) presents the lowest CSR is essentially contradictory. One might expect that poor women are more likely to be exposed to risk factors during pregnancy, which could justify delivery by caesarean section. However, this finding is consistent with results obtained by other authors, particularly in Brazil.[21,22]

Several reasons could be argued to explain such a situation, but among them, undoubtedly the care policies of each institution play an important role. For instance, the information that IMSS and ISSSTE have about their entitled populations means that a high proportion of women attend prenatal care from an early gestational age. This implies greater participation by a physician in the woman's care from early pregnancy; and it is the physicians then who follow the pregnancy and decide how it should end.

On the contrary, the SS assists people without social security under a scheme of free demand. This means that most of the women go to SS medical facilities only for childbirth (many times as an emergency) without attending a physician previously. In other words, caesarean sections at IMSS and ISSSTE are usually pre-scheduled, something that does not happen often at SS.

An aspect worth further discussion is the matter of what should be the ideal CSR. Based on an analysis of medical indications, Francome and Savage[8] conclude that the acceptable level should be around 7%. Also based on a study of medical indications, Pettiti[23] places it at 14%, accepting variations between 10 and 18%. Finally, Rattner[2] considers a 20% rate admissible. For the purposes of this study, the level proposed by WHO (15%) has been considered valid, being an intermediate value among the different recommended figures. It is worth noting that, even taking the extreme value (20%) proposed by Rattner – and considered as ideal by the Mexican Official Standard for the care of Pregnancy, Delivery, Puerperium and Newborns since 1995[15] – during the 1990s all the public institutions clearly exceeded this figure.

Although it is difficult to calculate the loss to society caused by the excessive number of caesarean sections performed in

Mexico (in this sense, the lack of accurate information about costs for natural and caesarean deliveries is certainly an important limitation of this study), the rough estimates made at least give an idea of their economic significance. Even without data for the SS, the cost will be in millions of dollars (in practice, an eight-digit figure), spent annually in an unnecessary way by health services. Although in other countries the economic cost of excess caesareans is also high,[24,25] there is an important difference between Mexico and some of them, especially the United States. In Mexico this money comes substantially from public funds, and therefore from the taxpayer, although in the case of the IMSS it also comes from the employers' contributions. Clearly, this represents for the institutions a greater demand on resources and hospital services (for example, regarding use of operating rooms and medical facilities, longer stay in hospital, etc.), which has repercussions on the institution's efficiency.

The incentives for private hospitals and clinics to provide caesarean sections are understandable (though not necessarily justifiable) since the price of a caesarean can be between 3900–13 000 Mexican pesos (US$520–1733, respectively, at the current rate of exchange).[26] However, high CSR are not so understandable in public health-care institutions, where charging for services does not play a relevant role, and where doctors receive no extra payment for performing caesarean sections. Indeed, it is difficult to believe that three out of every ten women who gave birth in Mexico's hospitals in the mid-1990s (in the population served by the ISSSTE, almost one out of every two women) were not in a condition to have a vaginal childbirth, that today's women are less prepared for natural delivery than those of 15 years ago, or that Mexican women are physiologically disadvantaged for natural delivery compared with women in other nations (several authors report for the Mexican female population secular increments in height[27,28] and a secular diminution of the age at menarche[28,29]).

Accounting for the significant growth of caesarean rates in Mexico goes beyond this study's aims and requires another type of investigation. However, it seems pertinent to point out some reasons that could be behind the increase. Although obstetricians emphasize that a decision to perform a caesarean section will have a clear medical basis, and they seem to be unaware of the excess of caesareans performed in Mexico,[iv] other aspects open to question are: the deep-rooted belief among the medical profession that the caesarean section is very safe and implies few risks, the speed of the procedure compared to vaginal delivery, the obstetrics teaching practice in hospitals, and the unwritten rules which state, for example, that a caesarean in the first delivery – something relatively common in Mexico, given the CSR observed since the 1980s – means that subsequent deliveries will be performed in the same way.

In addition, for many women from certain social sectors – those with greater educated and higher socioeconomic position – caesarean sections are culturally accepted, seen as the optimum form of delivery and, therefore, are requested.[14] Indeed, both the sustained increase in the CSR and its high level at the present time suggest that this is a public health problem which has not been satisfactorily taken on by the health sector authorities. Surely many unnecessary caesareans would be avoided if the policies of these public health-care institutions were to consider, as a priority, both the known higher risk implicit in a caesarean for the health of the mother and child – for example, in terms of maternal mortality, infections, haemorrhages or iatrogenic prematurity – and the economic impact of the excessive number of caesareans on the country and its health institutions. It is essential to achieve a reduction in caesarean rates for the good of the economy, but above all, for the well-being of mothers and their children.

Endnotes

[i] The national average cost is used for calculations; however, cost can vary according to the medical unit where delivery occurs. Using the average cost may not be a very accurate approximation, for a rough estimate of the excess cost attributable to the extensive use of caesarean section, it seems adequate.

[ii] The average cost for Jalisco State is used for calculations.

[iii] The difference in caesarean section cost between IMSS and ISSSTE could be explained in the way that the ISSSTE traditionally pays private institutions for some obstetric services (fundamentally caesarean sections) in areas where no ISSSTE hospitals exist. This fact (known as 'subrogation') considerably increases the cost of caesarean sections for the ISSSTE.

[iv] A well-known Mexican obstetrician stated: 'I wish the doctors who run the WHO were inside an operating room and aware of the problem that a gyneco-obstetrician has at the time of delivery. They talk about statistics, and I would like to know if the director of the WHO has ever put on a pair of gloves, and has been inside a gyneco-obstetrics ward, and has seen a patient suffer.' *Reforma.* October 5, 1997.

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Biographies

Guillermo J Gonzalez-Perez is a sociologist with an MSc in Demography and a Ph.D. in Health Sciences. He is a Titular Professor and Researcher at the Centre for Health, Population and Human Development Studies at the University of Guadalajara, Mexico. He is a member of Researchers' National System of Mexico.

Maria G Vega-Lopez is a sociologist with an MSc in Public Health and a Ph.D. in Health Sciences. She is a Titular Professor and Researcher, and head of the Centre for Health, Population and Human Development Studies at the University of Guadalajara, Mexico.

Carlos Cabrera-Pivaral is a medical doctor with an MSc in Health Education and a Ph.D. in Health Sciences. He is an Associate Professor and Researcher at the Centre for Health, Population and Human Development Studies at the University of Guadalajara, Mexico.

Armando Muñoz is a medical doctor with an MSc in Public Health. He is an Assistant Professor and Researcher at the Centre for Health, Population and Human Development Studies at the University of Guadalajara, Mexico.

Ana Valle is a historian with an MSc in Public Health. She is an Assistant Professor and Researcher at the Centre for Health, Population and Human Development Studies at the University of Guadalajara, Mexico.

Correspondence: Dr Guillermo J Gonzalez-Perez, Medrano 316, Sector Reforma, CP 44450, Guadalajara, Jalisco, Mexico. Email: ggonzal@udgserv.cencar.udg.mx