

## Cesarean section rates in Italian regions: 1998-2002

Maria Pia Fantini<sup>1</sup>, Laura Dallolio<sup>1</sup>, Elisa Stivanello<sup>1</sup>, Francesca Bravi<sup>1</sup>, Elena Savoia<sup>2</sup>

<sup>1</sup>Dipartimento di Medicina e Sanità Pubblica, Alma Mater Studiorum Università di Bologna, Bologna, Italy;

<sup>2</sup>Division of Public Health Practice, Harvard School of Public Health, Boston, USA

Correspondence to: Maria Pia Fantini, Dipartimento di Medicina e Sanità Pubblica, Alma Mater Studiorum Università di Bologna, Via San Giacomo 12, 40126 Bologna. E-mail: [mariapia@med.unibo.it](mailto:mariapia@med.unibo.it)

### Abstract

Cesarean section (c-section) rates have been increasing in many countries, and too frequently this rise does not seem to be justified by clinical grounds. To reduce c-section rates and achieve a proportion of 20% is among the goals of the Italian National Health Plan. In the following paper we provide an update on the distribution of rates amongst Italian regions and describe the association between regional hospital volumes and c-section rates. The national c-section rate increased from 31% in 1998 to 36% in 2002. The rates varied among regions and ranged from 20% in the Province of Bolzano to 56% in Campania. A significant association was observed between the regional hospital volumes for deliveries and c-section rates, regions with low hospital volumes performed more c-sections than high volume regions.

*Key words: Cesarean section, Italy, trends*

### Introduction

Giving birth by Cesarean section (c-section) is on the increase in many countries [1]. Recently, both health care professionals and researchers expressed concern about the increase in c-section rates, with some referring to it as an emerging 'global epidemic' [2-6]. The increased practice of c-section in many developing countries can be justified on clinical grounds, leading to reduced maternal and infant morbidity, as well as mortality [2]. However, the situation in developed countries is different, and the fact is that c-section deliveries do carry health risks and can lead to discomfort after birth [7-9]. An increase in c-section deliveries may also negatively impact on the health care system in terms of resource allocation as compared to normal deliveries [7,10]. Research conducted in various countries [1,2,11] suggests that concerns about the recent rise in c-section deliveries are justified because when rates exceed 15% maternal and infant health do not necessarily improve [12]. One of the goals of the Italian National Health Plan 2003-2005 is "to reduce the frequency of cesarean sections and achieve a proportion of 20% or less" [13].

The objective of this paper is to provide an update on c-section rates in Italy by region and to test the hypothesis that regional hospital delivery volumes may be a determinant for deliveries by c-section.

### Methods

The Ministry of Health - Division of Health Planning (Direzione Generale Programmazione

Sanitaria, Ministero della Salute) provided us with the regional data on the number of deliveries and the number of c-sections that occurred in Italy from 1998-2002, as defined by the Diagnosis Related Groups (DRG). C-section rates were calculated as the number of c-sections (DRG 370: c-section with complications and DRG 371: c-section without complications) divided by the total number of deliveries (DRG 370-375; DRG 372: c-section with or without complications, DRG 373 vaginal deliveries with and without complications, DRG 374: vaginal delivery with sterilisation and/or dilatation and curettage and vaginal delivery with another intervention except sterilisation and curettage) per 100 deliveries.

C-section rates were calculated by region and by geographical area: Northern (Piemonte, Valle d'Aosta, Lombardia, Prov. Trento, Prov. Bolzano, Veneto, Friuli-Venezia Giulia, Liguria and Emilia-Romagna), Central (Toscana, Marche, Umbria and Lazio), Southern (Abruzzo, Molise, Campania, Basilicata, Puglia and Calabria,) and the Islands (Sardegna and Sicilia).

In order to test the hypothesis of no association between geographical area and c-section rate a Chi-square test at the alpha level of 0.05% was performed.

Data on hospital volumes consisted of the proportion of Maternity Units in each region performing less than 400 deliveries per year. Afterwards the regions were classified according to the criteria: "high volume regions" when more than 60% of the Maternity Units performed more



than 400 deliveries per year and “low volume regions” when less than 60% of the facilities performed more than 400 deliveries per year.

The outcome was defined by classifying regions according to the proportion of c-sections: “low c-section rate regions”, equal to or less than 30% and “high c-section rate regions”, more than 30%.

The association between volumes and c-section rates has been tested by applying Fisher’s two sided test, assuming events as independent and accepting an alpha error equal to 0.05, Rosner’s method was used to identify the p-value [14]; the magnitude of the association was shown by the relative risk with 95% confidence intervals, computed as the ratio between the proportion of regions having a c-section rate >30% among the high volume regions and the proportion of regions having a c-section rate >30% among the low volume regions.

Analyses were carried out using STATA statistical package (version 8.0, Stata Corporation, College Station, Texas).

## Results

In 1998, the national c-section rate was 31.4 %, with a range of 17.3 % (Province of Bolzano) to 48% (Campania). In 2002, the national rate increased by 4.4 points to 35.8%, with a range of 19.9% (Province of Bolzano) to 56.1% (Campania) and as shown in Figure 1, the rate increased across all regions with a widening disparity amongst the geographical areas.

In 2002, there was a significant association between c-section rates and geographical areas (p-

value<0.001): the c-section rate in Northern Italy was smaller than in other areas (p-value<0,001). Similarly, the rate in Central Italy was smaller than in the South and the Islands (p-value<0,001). The rate registered in the Islands was smaller than in the South (p-value<0,001).

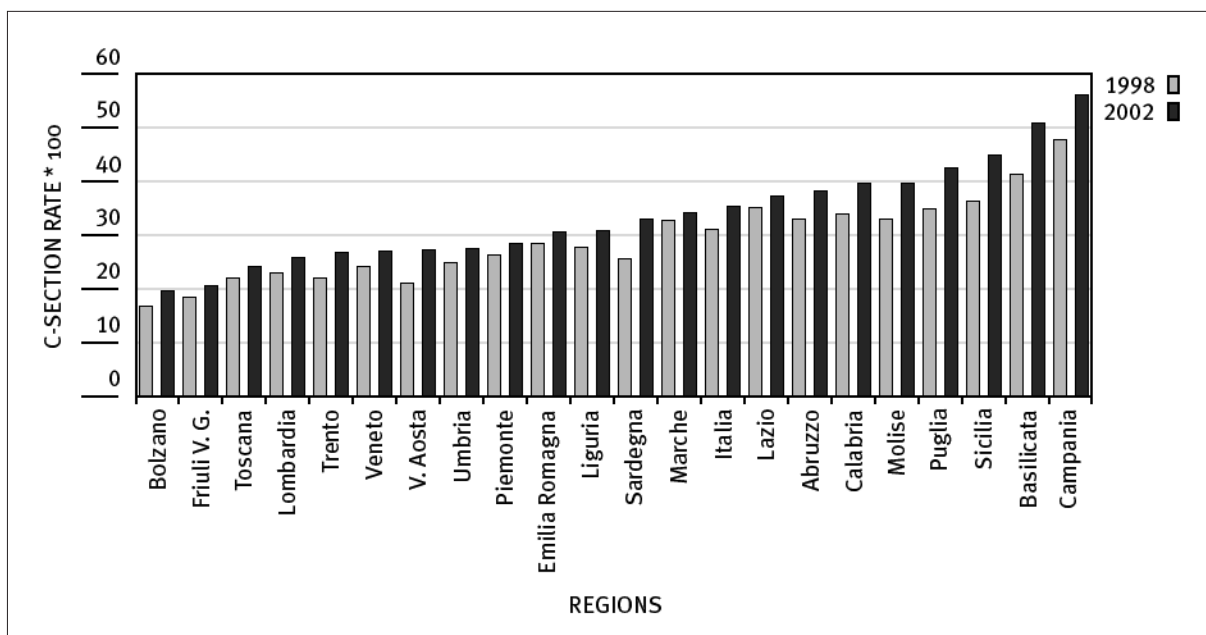
Figure 2 shows the relationship between c-section rate and the percentage of institutions performing more than 400 deliveries per year by region, this association was found to be significant (p-value=0,02). “Low volume regions” had a 118% increased risk of having c-section rates higher than 30%, when compared to “high volumes regions” (RR=2.18 95% I.C. 1.12-4.29). There were no “low volume regions” in North and Central Italy, whereas in the South, the prevalence of “low volume regions” was 67%.

## Discussion

This paper provides an updated description of the c-section rates in Italian regions. Our findings show that c-section rates are increasing both at national and regional levels and that the Italian c-section rate in 2002 was one of the highest in the world and the highest in Europe, as most countries have rates below 25% [15]. In addition our findings point out a relevant disparity amongst regions and similarly to previous studies [16], we observe an association between hospital volumes and c-section rates.

One of the limitations of our findings was the lack of risk adjustment. Regional variability can in part be explained by the differences in the mothers’ and foetus’ clinical health conditions

Figure 1. C-sections rates by regions in Italy 1998-2002



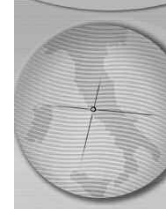
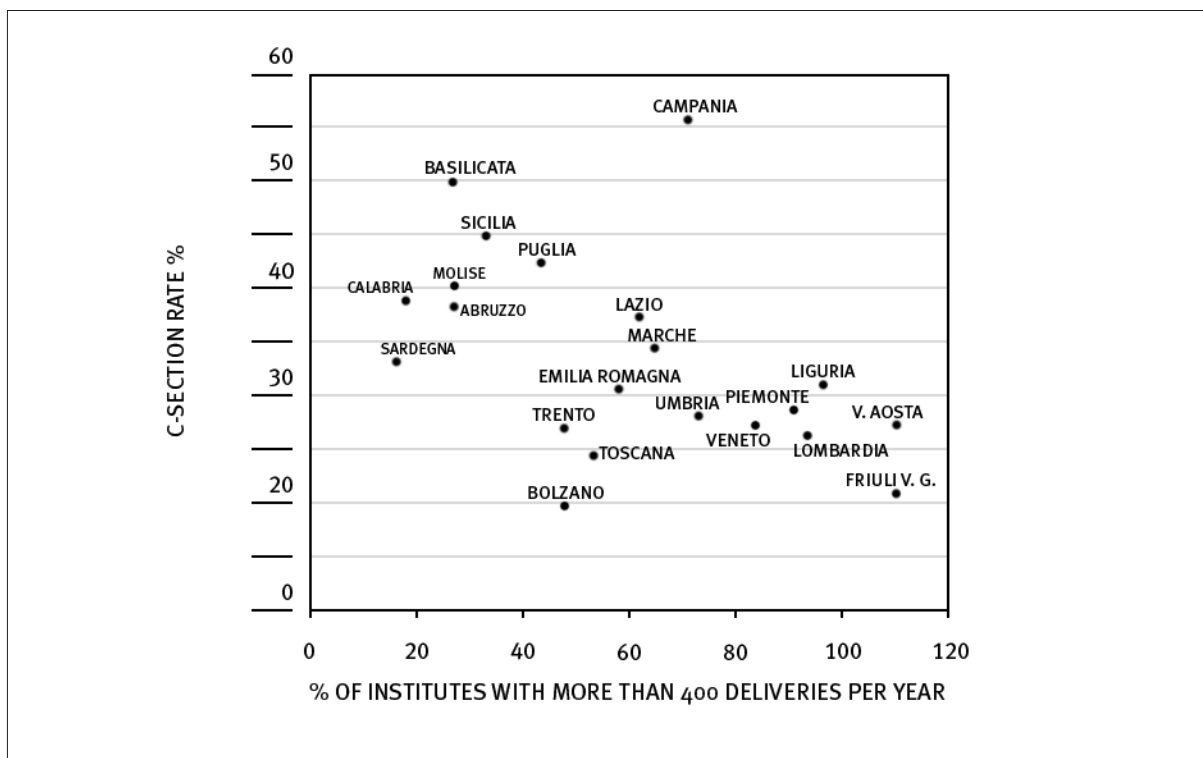


Figure 2. C-section rate and regional hospital volumes, 2002



(maternal age, breech presentation, placental abnormalities, foetal distress etc.) or by the differences in the prevalence of previous c-section interventions. The failure to account for these covariates may have lead to confounding bias in the results [17,18]. In order to address the issue of the soaring frequency of cesarean deliveries the American College of Obstetricians and Gynecologists recommended the use of case-mix adjusted c-section rates for any evidence-based assessment of quality of practice [19]. Moreover, the observed association between volumes and c-section rates may be underestimated because facilities with a higher number of deliveries may concentrate more cases requiring c-section intervention.

Additional factors like the mother's preferred mode of delivery, hospital financial incentives, or the type of health care organization, private or public, may also be potential confounders. As we are considering aggregated data, our unit of analysis is the region and not the maternity ward, therefore it is not possible to study the individual Maternity Unit's characteristics and compare them to the c-section rates.

Apart from showing a significant association between regional volumes and regional c-section rates our results do not explain the reasons of increasing c-section rates.

Previous studies, conducted in Italy, revealed

that, apart from the well-known medical indications, the procedure was performed for non-medical reasons [20,21].

Even though the current debate continues on which non-medical factors are acceptable, like the women's right to choose the mode of delivery [22], the concern remains about the great difference in rates amongst regions. Further research is needed to assess the determinants of c-sections in order to help explain the differences amongst geographical areas and hospital volumes.

**Acknowledgments**

We wish to thank Dr. Lucia Lispi from the Italian Ministry of Health (General Direction Programmazione Sanitaria, Livelli Essenziali di Assistenza e Principi Etici di Sistema) and Dr. Cinzia Marano from the National Observatory on Health in the Italian Regions (Osservasalute), who provided us with the data on DRGs in the Italian regions.

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