

## Original Article

# Rise in Cesarean Section Rate Over a 30-Year Period in a Public Hospital in Tehran, Iran

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## Abstract

**Background:** Numerous studies show a growing trend in cesarean section rates throughout the world, including Iran. However, existing evidence in our country is scant and previous reports are restricted to short time periods. The aim of the current study is to measure the trend in cesarean sections (CS) rates over the past 30 years in a referral hospital in Tehran.

**Methods:** We routinely collected data on the demographic characteristics of all women who gave birth in the hospital during the study period. The mode of delivery and the personnel in charge of delivery has like wise been recorded for each birth during the study period. The data were extracted from medical records and entered into a structured checklist.

**Results:** The rate of CS out of all deliveries increased from 14.3% in 1979 to 22.7% in 1989, 52.5% in 1999, and 85.3% in 2009 ( $P < 0.001$ ). The most common reason for CS was a repeated section. The percentage of vaginal deliveries performed by midwives has not changed significantly and the number of both midwives and obstetricians per 1000 births has increased, from 2.8 to 15.4 midwives per 1000 births and from 5.5 to 23.0 obstetricians per 1000 births.

**Conclusion:** Immediate strategies should be adopted to prevent the rising trend and increasing number of unnecessary CS in Iran.

**Keywords:** Cesarean section, infant mortality, maternal mortality, midwifery

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## Introduction

Since the 1970s the rate of cesarean sections (CS) has significantly increased in high-income countries, with an even steeper rise in middle and low-income countries. Overall, the rate of CS has risen from less than 7% in the 1970s to over 25% in 2003.<sup>1-5</sup> This increasing rate has occurred despite growing evidence about the undesirable outcomes of CS. Based on WHO recommendations released in 1985, a CS rate between 5%–15% of total deliveries has optimal efficacy and rates above 15% are unnecessary, inappropriate, and not reflective of better health outcomes.<sup>6,7</sup> Many studies have shown that the actual rate of CS in numerous countries is far higher than the recommended range, particularly in developing countries.<sup>8-13</sup> The WHO survey, which has been launched in 2005, shows that the mean CS rate is as high as 33% in Latin America,<sup>14</sup> and 27% in Asia.<sup>15</sup> The mean rate of CS is 8.8% in Africa due to overall inadequacy of health facilities, but evidence shows that the rate of unnecessary CS in existing facilities is still as high as some Latin American and Asian countries.<sup>16</sup>

The rise in CS rates is multi-factorial and under the influence of numerous underlying causes that include improved surgical techniques that reduce the risk of post-operative complications,<sup>17</sup>

demographic factors such as increased maternal age at pregnancy and higher frequency of repeat CS,<sup>18</sup> doctors' attitudes towards CS,<sup>19,20</sup> and demand from women who may believe that CS protects against urinary incontinence and prolapse.<sup>21,22</sup> Numerous reports have been published about the frequent complications of CS that include a higher risk of maternal mortality, admission to the intensive care unit, blood transfusion, hysterectomy, internal iliac artery ligation, hemorrhage, infection, thrombosis, and post-partum depression.<sup>14,15,23-26</sup> Complications for neonates include higher fetal mortality rates, higher risk of admission to intensive care, fetal respiratory syndrome, pulmonary hypertension, iatrogenic prematurity, and difficulty with bonding and breast feeding.<sup>27,28</sup>

In Iran, based on a report released by the Ministry of Health and Medical Education in 2005, CS accounts for 40.7% of all births across the country, 52% of deliveries in public health centers in Tehran, and over 64% of all deliveries in the private sector in Tehran.<sup>29</sup> The study by Ahmad-nia et al. shows over 35% growth since 2000.<sup>30</sup> Another study by Moini et al. has demonstrated an increase in the rate of CS from 35.4% in 1999 to 42.3% in 2003 in three teaching hospitals in Tehran.<sup>31</sup> The underlying causes of the increasing CS rate in Iran are similar to other countries, and include a change in women's preference, increased level of education, employment, age at marriage and pregnancy, and decreased number of intended pregnancies.<sup>31-33</sup>

Considering the significance of the growing CS rate in Iran and the scant existing data on its scope, we aim to measure the trend of CS rate in a main referral hospital in Tehran during the past three decades in order to provide a more realistic picture of the actual national trend.

## Materials and Methods

The current report was a retrospective descriptive study based on

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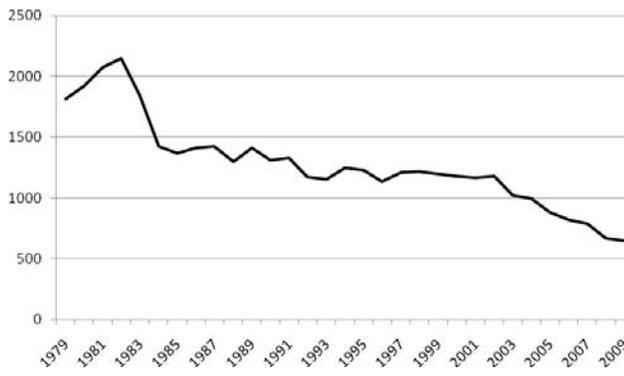


Figure 1. Total number of deliveries from 1979 to 2009.

routinely collected data in a public hospital in Tehran. The data was gathered during the past three decades (1979 to 2009). A structured checklist was used to collect data from medical records pertaining to all deliveries in the hospital during this time period. The collected information included date of delivery, age at delivery, place of residence, mode of delivery (vaginal or CS), person in charge of delivery (obstetrician or midwife), and the total number of obstetricians and midwives per 1000 births by year. The identity of all subjects and personnel was withheld and the data was de-identified.

Continuous variables were reported as mean  $\pm$  SD and nominal variables as percentages. Data were analyzed using the SPSS version 16.0 software package (SPSS, Inc., Chicago, IL).

## Results

The number of total annual deliveries has declined from 1812 in 1979 to 651 in 2009 (Figure 1). Results show that in 1979, from a total of 1812 deliveries, 14.3% were CS. In 1989, the total CS was 22.7% out of 1414 births, 52.5% of 1200 births in 1999, and 85.3% of 651 births in 2009 (Figure 2). The mean rate of CS was 16.5% in the 1980s, 38.0% in the 1990s, and 68.5% in the 2000s ( $P < 0.001$ ).

The percentage of women under 20 or over 35 was 9.1% in the 1980s, 11.4% in the 1990s, and 16.6% in the 2000s. The percentage of women referred from cities other than Tehran in the Tehran Province was around 8% in the 1980s, 12% in the 1990s, and 7% in the 2000s.

The most common reason for CS was repeated CS in all annual reports from 1979 to 2009. The second most common reason for CS was slow progression of labor in 1979 and 1989, which was replaced by cephalic pelvic disproportion in 1999 and 2009.

Results also showed that from 1552 vaginal deliveries in 1979, 55.4% were performed by midwives. This figure was around 56.9% in 1989, 70.5% in 1999, and 88.0% in 2009. The number of obstetricians employed in the hospital has increased from 10 in 1979 (5.5 per 1000 births) to 15 in 2009 (23.0 per 1000 births). The number of midwives has likewise increased from 5 in 1979 (2.8 per 1000 births) to 10 in 2009 (15.4 per 1000 births, Figure 3).

## Discussion

The results of the current study show that the rate of CS in a public hospital in Tehran had been within the range recommended

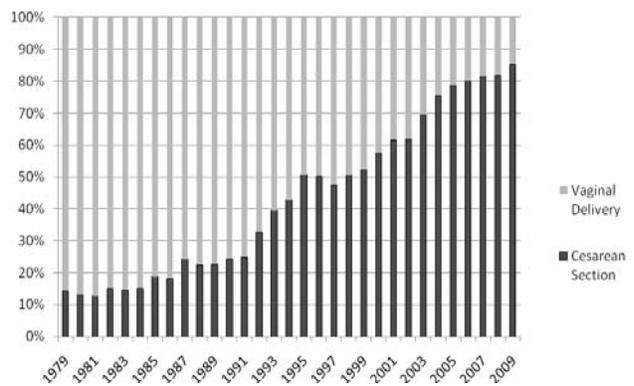


Figure 2. Percentage of cesarean sections from 1979 to 2009.

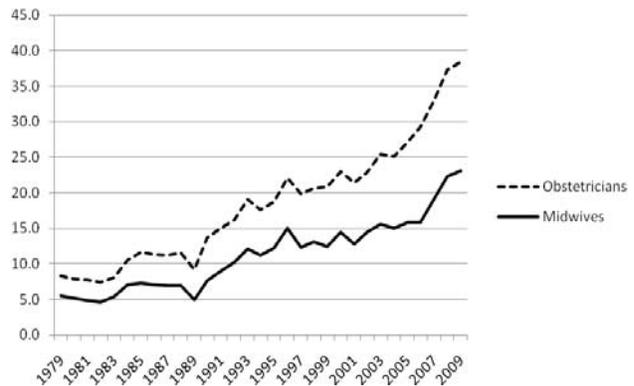


Figure 3. Number of obstetricians and midwives per 1000 births from 1979 to 2009.

by the WHO in 1979 (around 14%), but has increased by six-fold over the past three decades. These results are in accordance with previous reports that confirm the growing rate of CS in Iran.<sup>29–33</sup> Although comprehensive studies on CS rate have not been performed at the national level, these low-scale studies still reflect a rising trend in Iran, which is even steeper in the private sector.<sup>29</sup> A large proportion of the high CS rate is due to repeated sections and accounts for 31.2% of all deliveries by CS.<sup>31</sup>

Rushed conclusions will lead to an overestimation of the overall CS rate across the country. In this regard, several important points should be noted. The total number of deliveries has significantly declined during the study period to less than one third of the deliveries in 1979. This decrease partly reflects a reduction in the overall number of pregnancies in Iran. On the other hand, considering the expansion of the health system after the Islamic Revolution in Iran, it can be anticipated that many low-risk pregnancies must have been handled locally and only high-risk pregnancies were referred to the hospital under study (in Tehran), which lead to a much higher rate of CS.

Other changes in the demographics of mothers, such as the age at pregnancy, can also affect the CS rate.<sup>17</sup> As noticed in our results, the percentage of high-risk mothers (under 20 or over 35 years of age) has increased from 9.1% in 1980s to 11.4% in 1990s and 16.6% in 2000s. The high CS rate can partly be justified by changes in demographic patterns, which means if the rates could be adjusted by age and other risk factors, our estimations would be of less magnitude. The optimal range of CS rate partly depends

on the demographic profile of local communities and an identical approach should not be adopted in all conditions.<sup>17,34,35</sup> One of the main limitations of our study is that the frequency and trend of maternal risk factors among mothers referring to the hospital could not be measured.

Our results show that the number of midwives per 1000 births is much lower than that of obstetricians, which ideally should be higher. This fact implies an inappropriate preference toward involvement of specialists in deliveries. Nevertheless, it should also be noted that the number of both midwives and obstetricians per 1000 births has increased and is close to international standards (30 midwives and 35 obstetricians per 1000 births).<sup>36,37</sup> The rate of vaginal deliveries handled by midwives has not changed during the study period. This implies that, unlike reports from other countries, the rising trend of CS does not originate from lower involvement of midwives in deliveries.

Evidence shows that higher than recommended rates of CS are in many cases unnecessary and mainly originate from inappropriate concepts of mothers and medical personnel towards the benefits of CS. High CS rates also impose an unnecessary financial burden on the health system, which becomes worse in resource restricted settings.<sup>38</sup> Strategies to prevent high CS rates gain significance when the high risks of intra-partum and post-partum complications for mothers and infants are taken into consideration. Several studies show that elective CS is associated with significantly higher risk of mortality and morbidity in mothers and infants compared to vaginal delivery.<sup>14,15,24,28</sup> On the other end of the spectrum, CS rates that are lower than they need to be might also be associated with higher undesirable outcomes in mothers and infants. Many studies show that vaginal delivery in high-risk mothers (such as abnormal presentations) is associated with higher morbidity and mortality.<sup>14-16,39</sup> The differentiation of mothers eligible for CS from low-risk mothers is pivotal in the healthcare optimization. It is important that medical personnel accurately put guidelines into practice.

Policies that have recently been adopted in Iran mainly focused on training specialists, while the role of midwives in maternal care has been mostly neglected. Standardizing the distribution of personnel according to local needs and their appropriate training level is crucial in the optimization of resources, and we recommend placing it as a top priority at the national level. Additionally, mass media can have a great impact on the perception of the general population and can play an important role in the dissemination of an appropriate culture and attitude towards pregnancy and reproductive health.

In conclusion, there is an evident growing rate of CS in Iran, which is now becoming an epidemic. The exact magnitude of this trend and the underlying mechanisms need to be studied more comprehensively, and appropriate, immediate strategies at the national level are mandatory.

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