



When a caesarean section is necessary: Analysis of cesarean sections performed in the Republic of Turkey in 2022 in accordance with the World Health Organization Multi-Country Research Guidelines

Ne zaman sezaryen: Türkiye Cumhuriyeti'nde 2022 yılında uygulanan sezaryen operasyonlarının Dünya Sağlık Örgütü Çok-Ülkeli Araştırma Rehberi doğrultusunda incelenmesi

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Abstract

Objective: The aim of our study, in light of the World Health Organization Multi-Country Survey (WHO-MCS) data examining the data of the Ministry of Health for the year 2022, comparing the cesarean sections (C/S) performed in the Republic of Turkey (TR) with the WHO-MCS data, and comparing the number of cesarean sections applied more than the reference values.

Materials and Methods: According to the database of the Turkish Ministry of Health, in 2022, 1166175 deliveries took place in the Republic of Turkey, and 706370 (60.5%) cesarean section deliveries were recorded as 365764 (51%) primary C/S. Using the Ministry of Health registration system based on the Robson classification.

Results: The number and rate of C/S operations performed per birth in 2022 in TR (n=706370; 60.50%) were found to be significantly higher when compared to the number and rate of C/S on a global scale (n=246062; 21.10%), (p<0.001). When cesarean section operations performed in the Ministry of Health hospitals, private institutions, foundation universities, public universities and other public unit hospitals were compared with WHO MCS reference values and C/S ratios, 44.2% versus 24.7% (p=0.05), versus 77.4%, versus 34.2% (p<0.001), 74.3% versus 29.5% (p<0.001), 75% versus 35.8% (p<0.001), 69.3% versus 35.9% (p<0.001).

Conclusion: The amount of cesarean sections performed according to the total number of births in the Turkish Republic is relatively high and its cost nearly 1 billion 750 million TL.

Keywords: Republic of Turkey, cesarean section, normal birth, the year 2022, World Health Organization Multi-Country Survey (WHO-MCS) data guide

Öz

Amaç: Çalışmamızın amacı, Dünya Sağlık Örgütü Çok Ülkeli Araştırma (WHO-MCS) verileri ışığında, Sağlık Bakanlığı'nın 2022 yılı verilerini inceleyerek, Türkiye Cumhuriyeti'nde (TR) yapılan sezaryenleri (C/S) WHO-MCS verileri ile karşılaştırmak ve referans değerlerden daha fazla uygulanan sezaryen sayısını karşılaştırmaktır.

Gereç ve Yöntemler: T.C. Sağlık Bakanlığı veri tabanına göre, 2022 yılında Türkiye Cumhuriyeti'nde 1166175 doğum gerçekleşmiş ve 706370 (%60,5) sezaryen doğum 365764 (%51) primer C/S olarak kaydedilmiştir. Robson sınıflandırmasına dayalı Sağlık Bakanlığı kayıt sistemi kullanılmıştır.

Bulgular: TR'de 2022 yılında doğum başına gerçekleştirilen sezaryen operasyon sayısı ve oranı (n=706370; %60,50), küresel ölçekteki sezaryen operasyon sayısı ve oranı (n=246062; %21,10) ile karşılaştırıldığında anlamlı derecede yüksek bulunmuştur (p<0,001). Sağlık Bakanlığı hastaneleri, özel kurumlar,

PRECIS: In this article, caesarean section rates in Turkey are compared with international Robson standards. Accordingly, statistical tests of the rates in Turkey were performed. According to these results, some inferences have been made in the light of the striking statistics.

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vakıf üniversiteleri, devlet üniversiteleri ve diğer kamu birim hastanelerinde gerçekleştirilen sezaryen operasyonları DSÖ MCS referans değerleri ve C/S oranları ile karşılaştırıldığında, %44,2'ye karşı %24,7 ($p=0,05$), %77,4'e karşı %34,2 ($p<0,001$), %74,3'e karşı %29,5 ($p<0,001$), %75'e karşı %35,8 ($p<0,001$), %69,3'e karşı %35,9 ($p<0,001$).

Sonuç: Türkiye Cumhuriyeti'nde toplam doğum sayısına göre yapılan sezaryen miktar nispeten yüksektir ve maliyeti yaklaşık 1 milyar 750 milyon TL'dir.

Anahtar Kelimeler: Türkiye Cumhuriyeti, sezaryen, normal doğum, 2022 yılı, Dünya Sağlık Örgütü Çok Ülkeli Araştırma (WHO-MCS) veri kılavuzu

Introduction

In recent years, there has been a significant increase in cesarean section delivery (C/S) practices in many countries worldwide. Not applying cesarean delivery when necessary or applying it unnecessarily brings with it many problems⁽¹⁾. The Robson Classification System is a universal reference for evaluating and tracking cesarean section rates in healthcare facilities. This reference system is accepted by the International Federation of Gynecology and Obstetrics and the European Board of Obstetrics and Gynecology. The World Health Organization has developed a global reference for C/S ratios from the Multi-Country Survey (WHO-MCS) C-Model⁽¹⁻³⁾. In this classification system, a 50% C/S ratio is accepted as the threshold value, and Robson groups are formed by maternal obstetric clinical evaluation. The Robson classification is a perinatal classification that covers all delivery methods consisting of 10 subgroups⁽⁴⁾. The advantages of the Robson test are that it is reproducible, simple, clearly articulated, and prospective.

Cesarean delivery has many risk factors in terms of anesthesia and gynecology compared with vaginal delivery⁽⁵⁾. Complications that may develop due to cesarean delivery and anesthesia may cause severe consequences for the mother and the baby⁽⁶⁻⁸⁾. The economic cost of a standard C/S operation exponentially creates a considerable burden on the country's economy in the event of an unexpected complication.

Our study, using the Turkish Ministry of Health data for the year 2022, is planned to examine the C/S application according to the months during the year, the provinces throughout the country, the Robson classification, and between hospitals. We aim to detect off-label cesarean section operations in our country. The aim of calculating the economic cost of off-label C/S operations is to show the negative effects it creates on the effective functioning of health services in seizure conditions and the workload of the anesthesiology department doctors.

Materials and Methods

The Turkish Ministry of Health has started to record birth analysis in the country with the registration system established in 2012. In line with family planning and demographic analysis, an electronic registration system was initiated in 2014. All health units and institutions providing obstetrics and gynecology services upload patient data to the automation system with an electronic signature. These data, including obstetric evaluation, Robson classification, and birth information, are then transferred to the automation system of the Ministry of Health. The

Robson-10 group classification comprises 10 evidence-based, comprehensive, mutually exclusive subgroups. The obstetric evaluation criteria used were parity, gestational age, previous cesarean section, fetal presentation, labor onset, and the number of fetuses. This study was initiated after the necessary approvals were obtained with the decision of the Ministry of Health dated 05.29.2023 with the numbers E-76244415-000-216532095. According to the Turkish Ministry of Health database, 1166175 deliveries occurred in Turkey in 2022, and 706370 (60.5%) cesarean deliveries were examined. Hospitals where cesarean delivery was performed were recorded as Ministry of Health hospitals, university hospitals, foundation university hospitals, private hospitals, and other health-related public institutions.

Statistical Analysis

The inspected and recorded data in the study were analyzed using the IBM SPSS 20.0 (Chicago, IL, USA) statistical program. Data are presented as n (number) and percentage (%). The chi-square test was used to compare two ratios. $P<0.05$ were considered statistically significant.

Results

When the data were analyzed, 1166175 births were recorded nationwide in 2022. The rate of cesarean section performed in labor was 60.5% ($n=706370$). 2022 Turkey total Caesarean section number distribution rates in Ministry of Health, private institutions, foundation universities, state universities and other public unit hospitals are rates 36.69%, 54.89%, 1.91%, 6.23% and 0.28%, (total 100%) respectively (Figure 1). The number and rate of C/S operations per birth in the Republic of Turkey ($n=706370$; 60.50%) were found to be significantly higher when compared to the global number and rate of C/S ($n=246062$; 21.10%) ($p<0.001$).

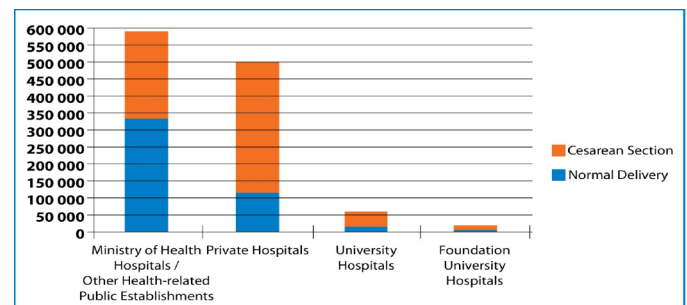


Figure 1. Distribution of births in 2022 across Turkey by institutions

On a global scale, when C/S ratios calculated with reference values are compared between hospitals, cesarean delivery was mainly performed in private hospitals; C/S delivery rates performed in private hospitals in Turkey were statistically significantly higher than reference values (77.4% versus 34.2%; $p < 0.001$). Similarly, in university hospitals (75% versus 35.8%; $p < 0.001$), foundation university hospitals (74.3% versus 29.5%; $p < 0.001$), Ministry of Health hospitals (44.2% versus 24.7%; $p = 0.05$) and other public units (69.3% versus 35.9%; $p < 0.001$) (Figure 2).

A statistically significant difference was observed when non-reference cesarean delivery rates were compared between hospitals ($p = 0.001$) (Table 1). The rate of non-reference cesarean section was statistically the least determined in the hospitals of the Ministry of Health (19.5%). There was no statistically significant difference in non-reference cesarean section rates between private hospitals, state universities, and foundation university hospitals ($p = 0.750$).

When labor rates were analyzed between Robson subgroups and hospitals, the highest rates of labor in Robson-2, 3, 4, 5, and 10 groups were in the Ministry of Health hospitals, respectively, with a rate of 48.9%, 72.4%, 60.2%, 47.3%, and 50.8%. In private hospitals labor occurred at rates of 55.7%, 70.9%, 60.2%, 50.7%, and 67.2% in Robson-1, 6, 7, 8, and 9 groups, respectively. Table 2 shows the values of total births by hospitals according to Robson classes.

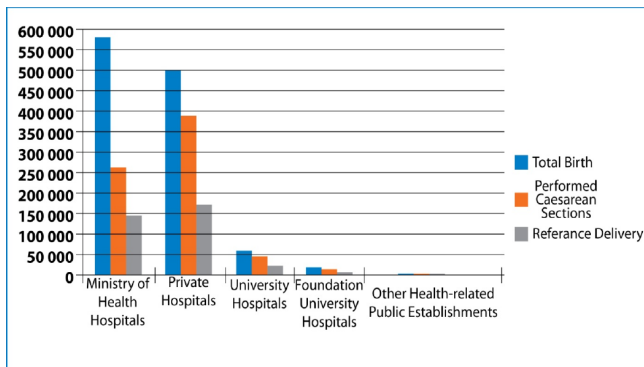


Figure 2. Total, cesarean and reference cesarean section numbers by hospitals

Table 1. Non-reference cesarean section rates between hospitals

	Ministry of Health Hospitals/Other Health-related Public Establishments	Private Hospitals	Public University Hospitals	Foundation University Hospitals	p-value
Total Birth	588600	500800	58697	18230	
Performed Caesarean Sections	261200	387600	44034	13441	
Reference Delivery (%)	115200 (19.5%)	216277 (43.1%)	23133 (39.4%)	8089 (44.3%)	0.001

C/S ratios performed in Robson groups compared with reference values (Table 3), Group 6 (99.8% versus 97.6%, $p = 0.155$), Group 7 (98.4% versus 95.5%, $p = 0.254$), respectively and Group 9 (98.2% vs. 95.7%, $p = 0.407$), there was no statistically significant difference. When reference values and actual C/S ratios in other groups are compared, respectively, Group 1 (9.4% versus 59.6%; $p < 0.001$), Group 2 (31.3% versus 54.3%; $p = 0.001$), Group 3 (1.6% versus 15.8%; $p < 0.001$), Group 4 (11.1% versus 22.3%; $p = 0.036$), Group 5 (61.2% versus 98.4%; $p < 0.001$), Group 8 (54.0 versus 94.4%; $p < 0.001$) and there was a statistically significant difference in Group 10 (29.7% versus 68.8%; $p < 0.001$).

When cesarean deliveries were analyzed by months in 2022, C/S deliveries were significantly higher in each month compared to reference values ($p < 0.001$) (Table 4). There was no statistically significant difference between the months.

When the data were analyzed among the provinces, the three provinces with the highest number of C/S births were Karabük, Kırklareli, and Zonguldak. The C/S ratios of these provinces against reference values were statistically significantly higher ($p < 0.05$) (Table 5). Şırnak, Ardahan, and Kilis were determined as the three provinces where the cesarean section was the least. There was no statistically significant difference between the C/S ratios of these provinces against reference values ($p = 0.067$, $p = 0.115$, $p = 0.098$) (Table 5). When the first three big cities of Turkey (Ankara, Istanbul, Izmir) were examined, the cesarean section rates were statistically higher than the reference values ($p < 0.05$) (Table 5).

Discussion

Worldwide, between 1990 and 2018, C/S applications increased by 19%. This rate has increased by more than 50% in TR. Although the latest data show that C/S implementation is 21% worldwide, this rate is predicted to approach 30% between 2021 and 2030⁽⁹⁾. According to the Organization for Economic Co-operation and Development (OECD) 2020 data, TR has the highest rate after Mexico (58%), with a C/S rate of 57% (573/1000 live births)⁽¹⁰⁾. In our study, data for 2022 show that C/S application is 60.5% in TR. In the study of Molina et al.⁽¹¹⁾, the optimum C/S ratio was reported as 19% in terms of maternal and neonatal mortality, and the WHO

recommendation is 10-15% in some countries where perinatal mortality is below 10%. The results of our study clearly show that cesarean section rates in TR were found to be remarkably higher than the reference values.

C/S indication is an approach that needs special attention to prevent maternal and perinatal mortality⁽⁴⁾. In a 2015 study covering 169 countries, it was determined that approximately 29.7 million pregnant women had cesarean sections. This shows that cesarean delivery has increased exponentially in the last 20 years⁽⁴⁾. Indications for cesarean section include maternal pelvic deformity, eclampsia and HELLP syndrome, fetal stress, cord prolapse, placenta previa, uterine rupture, previous cesarean delivery history, prolonged delivery, fetal presentation, and major antepartum hemorrhage⁽³⁻¹³⁾. Studies in the literature also show that cesarean section operations performed within indications are lifesaving. Surgical complications of cesarean delivery include; postpartum infection (surgical area), hemorrhage and blood product transfusion, hysterectomy, prolongation of hospital and intensive care unit length of stay, maternal mortality, neonatal respiratory complications, and fetal mortality can be listed⁽¹⁴⁻¹⁶⁾. Long-term complications such as abnormal adherent placenta, uterine rupture, and adhesions may also be seen⁽¹⁷⁾. In Canada, 308755 C/S applications were examined, and it was stated that although the risk of uterine rupture is higher in vaginal delivery, maternal mortality may increase with C/S application⁽¹⁸⁾. In C/S, it was stated that the applications performed within the indication can reduce maternal mortality and morbidity by 1% to 5%⁽¹⁹⁾. In the study conducted in Ireland, cesarean section and vaginal delivery were compared; although the number of maternal mortality was higher in cesarean section, no statistically significant difference was found⁽²⁰⁾. Inference from these studies shows that maternal mortality in cesarean delivery can be associated

with nonsurgical practices. Cesarean section delivery also brings with it complications of anaesthesia. Among the complications of anesthesia application; are failed intubation, failed regional anesthesia, high-level anesthesia, headache, chemical meningitis, epidural hematoma, and extradural abscess⁽²¹⁾. C/S indications under general anesthesia are hematological neurological, infectious, congestive heart failure, severe preeclampsia, local anesthesia allergy, spinal cord arteriovenous malformation, placenta areata and fetal factors⁽²²⁾. In the study of Bloom et al.⁽²¹⁾, in which 37142 cesarean deliveries were examined, neonatal complications were compared with the type of anesthesia applied, and low Apgar score and umbilical artery pH values were found. These complications were

Table 3. Comparison of actual and reference cesarean section rates between Robson groups

Robson	Actual Cesarean Rate (%)	Cesarean Rate Calculated with Reference Values (%)	p-value
1	59.67%	9.43%	<0.001
2	54.37%	31.34%	0.001
3	15.84%	1.69%	<0.001
4	22.33%	11.12%	0.036
5	98.48%	61.20%	<0.001
6	97.61%	99.84%	0.155
7	95.54%	98.48%	0.254
8	94.47%	54.04%	<0.001
9	95.72%	98.23%	0.407
10	68.84%	29.72%	<0.001

Table 2. Values of total births by hospitals according to Robson classes

Robson	Institutions				Number of births, n/%
	Private	Foundation University	Ministry of health and other public institutions	University	
1	55.7%	2.2%	38.2%	3.9%	299600/25.7%
2	43.3%	3.1%	48.9%	4.7%	35800/3.1%
3	23.4%	0.8%	72.4%	3.4%	302948/26.0%
4	35.7%	1.7%	60.2%	2.4%	31051/2.7%
5	45.5%	1.5%	47.3%	5.7%	269300/23.1%
6	70.9%	1.8%	22.2%	5.1%	31049/2.6%
7	60.2%	0.9%	31.5%	7.4%	28241/2.4%
8	50.7%	1.9%	36.4%	11%	38439/3.3%
9	67.2%	1.6%	27.1%	4.1%	18447/1.6%
10	38.7%	1.4%	50.8%	9.1%	111300/9.5%
Total Birth Number					1166175

primarily associated with cesarean indication, gestational age, and emergency cesarean section. One maternal death recorded in the study was directly related to anaesthesia. In C/S, more studies are needed on intensive care and prolonged hospitalizations due to anaesthesia/surgical application. These studies show that especially off-label cesarean section practices pose severe risks in terms of fetal and maternal aspects. As seen in our study, off-label cesarean section rates were high in TR. We think that more stringent measures should be taken in this regard. More studies are needed on the complications of off-label C/S operations.

C/S application is applied in line with clinical and nonclinical evaluations⁽²³⁾. Studies show that nonclinical factors play an essential role in the decision of off-label C/S operations⁽²³⁾. These factors include sociocultural situations, economic factors, the

health system malpractice and fear of professional lawsuits caused by complications⁽²⁴⁾. In particular, obstetricians having to deal with lawsuits and forensic investigations is a critically important etiology⁽³⁾. The WHO 2020 reports made recommendations to prevent C/S application with nonclinical indications⁽²⁵⁾. This recommendation and the points to be considered are the dissemination of vaginal birth training, effective application of relaxation techniques such as deep breathing under the control of midwives and nurses, including couples in a psychosocial program, and psychological rehabilitation of pregnant women against the fear of pain⁽²³⁾. We think that there is a need for detailed studies in TR on these issues as well.

In our study, dystocia with cephalic presentation may increase the risk of cesarean delivery, especially in groups 1 and 2 with nulliparity in Robson Group 1-2-3-4-5-8-10, which exceeded the reference values. In Robson Group 6-7-9, the actual C/S action was calculated below the reference values. Robson Group-1 represents the least risky pregnant women, and the hospitals most applied to are private hospitals, with a rate of 55.7%. In 2022, C/S was applied to 387600 pregnant women out of 500800 applications for labor in private hospitals. Sociocultural factors and psychosocial conditions of pregnant individuals may have provided this orientation. In Robson Group 10 consisting of preterm actions, 50.8% of the pregnant women applied to the hospitals of the Ministry of Health. In addition, clinical evaluations and classifications should not put psychosocial factors into the background^(26,27). According to the results of our study, the rate of cesarean section is very high in the Robson group 1 and 2 pregnant groups, which is the most preventable cesarean section group, compared to the reference values throughout the country, and we think that private hospitals serving in Turkey should be informed and investigated on this issue.

C/S operations constitute a significant part of surgical operations performed under emergency conditions. According to the 2022 TR Ministry of Health data, 209,623 (41%) of 502,692 out-of-hours/emergency operation reports were recorded as emergency

Table 4. Comparison of cesarean rates according to months with reference cesarean rates

Time (month)	Actual Cesarean Rate (%)	Cesarean Rate Calculated with Reference Values (%)	p-value
2022-01	59.92%	29.59%	<0.001
2022-02	60.17%	29.80%	<0.001
2022-03	60.31%	29.75%	<0.001
2022-04	60.55%	29.34%	<0.001
2022-05	60.58%	29.51%	<0.001
2022-06	61.79%	29.84%	<0.001
2022-07	60.07%	29.14%	<0.001
2022-08	60.31%	29.42%	<0.001
2022-09	60.67%	29.49%	<0.001
2022-10	60.11%	29.01%	<0.001
2022-11	61.30%	29.55%	<0.001
2022-12	61.04%	29.21%	<0.001

Table 5. Comparison of the rates of cesarean delivery according to the reference value, with the highest / lowest rates and three big cities

City	Provincial ranking in Turkey according to the cesarean section rate	Actual Cesarean Rate	Cesarean Rate Calculated with Reference Values	p-values
KARABÜK	1	82.69%	32.71%	<0.001
KIRKLARELİ	2	79.93%	31.95%	<0.001
ZONGULDAK	3	79.84%	33.34%	<0.001
İZMİR	20	68.08%	30.53%	<0.001
İSTANBUL	34	63.10%	27.65%	<0.001
ANKARA	40	61.65%	27.45%	<0.001
ŞIRNAK	79	37.33%	25.22%	0.067
ARDAHAN	80	33.13%	22.61%	0.115
KİLİS	81	28.61%	19.40%	0.098

SCs. In the Health Implementation Communiqué (SUT) decree, the cost of SC operations in 2022 is stated as 3,692 Turkish liras per birth⁽²⁸⁾. In our study, while the World Health Organization reference value was n=246062 (21.1%) in 2022, n=460308 (difference 39.4%) cesarean delivery difference was calculated in the TR. When the cost is calculated, 1 billion 750 million Turkish Liras burdens the country's economy due to preventable cesarean section practices. The current assessment was performed without considering the complications and additional costs incurred. The report prepared by WHO emphasized that off-label C/S applications should be considered, especially in middle and low-income regions, in terms of consumption of country resources⁽²⁹⁾. Cesarean section operation is performed by an efficient team of anesthesiology and reanimation and gynecology and obstetrics units. It should not be forgotten that the process directly concerns many units and allied health teams within the health institution. Moreover, C/S applied off-label negatively affects the working motivation of the anesthesia and surgical teams.

Study Limitations

The limitations of our study were that our data were related to system logs. The electronic recording system and the data transfer process cannot ignore possible missing records. This study did not have data on maternal and neonatal short- and long-term complications. The type of anesthesia applied in C/S was not recorded. Robson grouping was not performed in the C/Ss that were made with the decision of emergency operation.

Conclusion

Statistical studies show that the C/S ratio will approach 30% worldwide in 2030. In 2022, this rate was 60.5% in TR. If preventable C/Ss were implemented, 1 billion 750 million Turkish liras could only be brought into the country's economy in 2022.

The Robson classification in C/S application is the accepted reference guide today. The fact that nonclinical factors do not constitute an indication for C/S operation is an issue that requires effort. Off-label C/S adversely affects the motivation of anesthesia and obstetrics units and makes the mother and newborn vulnerable to many complications.

Ethics

Ethics Committee Approval: Not necessary.

Informed Consent: Not necessary.

Peer-review: Internally peer-reviewed.

Authorship Contributions

Design: Ş.B., Ü.M.P., Data Collection or Processing: Ş.B., Ü.M.P., Analysis or Interpretation: Ş.B., Ü.M.P., Literature Search: Ş.B., Ü.M.P., Writing: Ş.B., Ü.M.P.

Conflict of Interest: No conflict of interest was declared by the authors.

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