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Cesarean Section Rates in Armenia: A Robson Classification Analysis of a Tertiary Care Hospital's Experience

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Abstract

Background: This study examines the cesarean section (CS) rates in Armenia, focusing on the experience of a tertiary care hospital, Erebouni Medical Center, utilizing the Robson classification system. Erebouni Medical Center, renowned for its comprehensive medical services, including obstetric care, serves as a vital resource for maternal and neonatal health in Armenia. **Methods:** This cross-sectional study was carried out on 14105 women who delivered from 1th Januar 2018 to 31th December 2020 in Maternity House of Erebouni medical center. Data was collected from the women admitted for delivery using Robson's Pro forma. Relative size and caesarean rate of each group and overall caesarean section rate was calculated. ***Results:*** Of the total 14105 deliveries, 6826 (44.5%) were caesarean deliveries and 7280 (55.5%) had vaginal deliveries. The examination of cesarean section (CS) rates at Erebouni Medical Center over the period of 2018-2020 unveils a substantial surge from 36.8% in 2016 to 46.2% in 2022. During the study period most pregnant women, comprising 26.6% of the total, were classified under group 3 of the Robson classification. Subsequently, we observed a gradual decrease in percentage distribution across other groups: group 1 accounted for 21.8% of cases, group 5 represented 13.4%, group 2b comprised 10.4%, and group 10 constituted 9.6% of cases, respectively. The remaining Robson groups each represented less than 5% of the total percentage distribution.

Keywords: Cesarean section, Robson classification, maternal and neonatal health, Erebouni Medical Center, Armenia, retrospective analysis, age groups, delivery outcomes.

Introduction

Cesarean section (CS) rates have been steadily rising worldwide, sparking debates and concerns among healthcare professionals and policymakers [1-5]. Understanding the factors contributing to this trend is imperative, particularly in countries like Armenia where healthcare resources may be limited. In this study, we aim to analyze the cesarean section rates in Armenia, focusing on the experience of tertiary care hospital, utilizing the Robson classification system.

Erebouni Medical Center, established in 1991, stands as one of the largest and most comprehensive medical facilities in Armenia. Offering a spectrum of medical services ranging from emergency care to specialized surgeries, diagnostic procedures, and therapeutic interventions, Erebouni Medical Center has emerged as a cornerstone of healthcare provision in the country. Among its array of services, the maternity hospital within the center plays a pivotal role, overseeing the delivery of approximately 5600 newborns annually. Given its robust infrastructure and high volume of obstetric cases, Erebouni Medical Center falls under the category IIIA / further Tertiary Care Hospital / obstetric inpatients, signifying its significance as a vital resource for maternal and neonatal care in Armenia.

In a 2011 systematic review conducted by Torloni and colleagues [6], a comprehensive analysis of 27 caesarean section classification systems was conducted. Among these, Robson's ten-group classification system [7] emerged as the most suitable for comparative analysis of surgery rates. This system categorizes deliveries into ten distinct groups based on five essential parameters: obstetric history (including parity and prior caesarean sections), onset of labor (spontaneous, induced, or caesarean section before labor onset), fetal presentation or lie (cephalic, breech, or transverse), number of neonates, and gestational age (preterm or term).

Robson's classification scheme offers a practical and straightforward approach, as it ensures mutual exclusivity and total inclusivity of cases. Moreover, its prospective applicability allows for immediate classification of women upon admission for delivery, utilizing routinely recorded variables. This feature facilitates institution-specific monitoring and auditing while facilitating standardized comparisons across different healthcare settings, regions, and time periods.

The Robson classification has proven invaluable in analyzing trends and determinants of caesarean section utilization across a spectrum of healthcare facilities, spanning both high-income and low-income countries [8,9]. Its utility extends to the analysis of state, national, and international datasets, including participation in initiatives such as the WHO Global Survey of Maternal and Perinatal Health, which encompassed data from eight Latin American countries [10-15].

This study aims to investigate cesarean section rates specifically within the context of the Erebouni Medical Center, leveraging the structured framework provided by the Robson classification system. Through the systematic categorization of deliveries based on key obstetric parameters, our objective is to gain insights into the factors influencing CS rates. This understanding will inform targeted interventions aimed at optimizing obstetric care delivery and ultimately improving maternal and neonatal outcomes.The primary objective of this study is to conduct a comprehensive analysis of cesarean section rates at Erebouni Medical Center, employing the Robson classification system. Through this analysis, we aim to identify specific obstetric populations driving the CS trends within the facility. By understanding the underlying contributors to CS rates, we endeavor to develop evidence-based strategies for enhancing obstetric care practices and mitigating unnecessary surgical interventions.

Materials and Methods

A retrospective analysis of patients' birth histories was conducted for the years 2018 and 2020 at Erebouni Medical Center, a Tertiary Care hospital in Armenia. Each patient was assigned to one of the ten groups of the Robson classification system, ensuring that each patient belonged to a single specific group according to the principle of classification.

This retrospective study utilized data collected from childbirth records at Erebouni Medical Center, encompassing demographic information, obstetric history, delivery details, and outcomes. The data spanned the period from 2018 to 2020. The Robson classification system was employed to categorize births into ten mutually exclusive groups based on obstetric parameters.

Cesarean section (CS) rates were calculated for each Robson group, and the contribution of each group to the overall CS rate was analyzed to identify specific obstetric populations driving the cesarean section trend within the hospital.

Statistical analysis of the obtained data was performed using the Statistica 10 application package, employing nonparametric tests. Statistical significance was considered at $p < 0.05$.

This classification system categorizes deliveries into ten groups based on obstetric parameters, facilitating the analysis of cesarean section rates and obstetric outcomes.

Results

Investigating the trends in obstetric care at Erebouni Medical Center's maternity hospital over the past seven years reveals notable insights (Fig. 1). As depicted in Figure 2, there has been a remarkable uptick in both the number of pregnant women (16%) and childbirths (19.3%) in recent years.

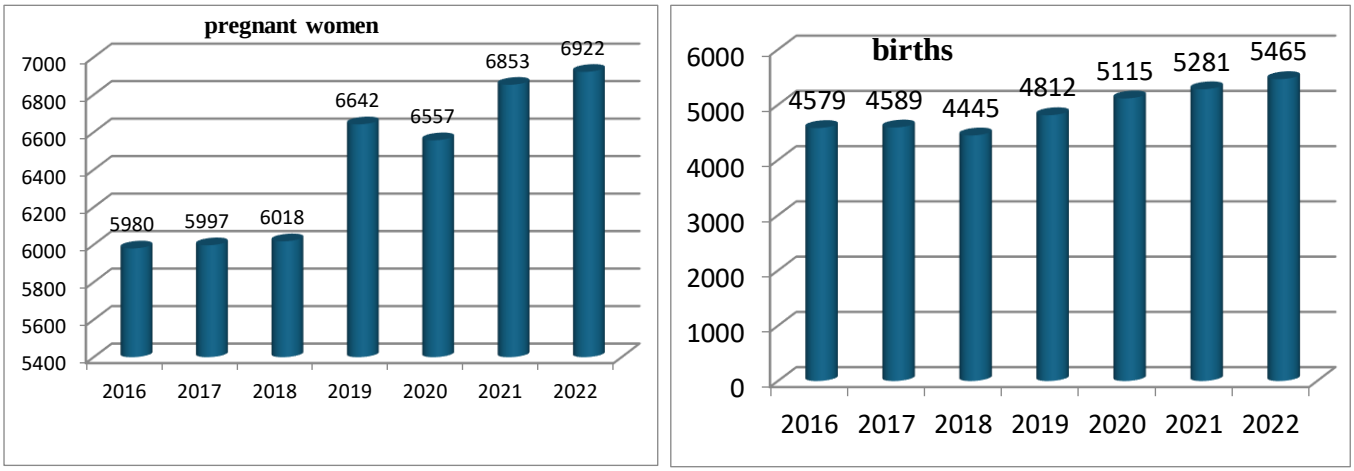

Figure 1: Indicators of Pregnant Women and Childbirth at Erebouni Medical Center (2016-2022)

Upon examining the demographic structure of pregnant women at Erebouni Medical Center with respect to age groups (Fig. 4), we found that the average age of pregnant women was 29.2±1.3 years. Classifying pregnant women based on age and Robson's classification groups yielded the following insights. In the age groups under 30 and 30-35 years old, groups 3, 1, and 5.1 of Robson's classification predominated, accounting for 30%, 25%, and 12% of cases, respectively. Conversely, in the age group of 36 years and older, groups 5.1, 3, 2b, 1, and 10 were prominent, comprising 19.5%, 16%, 15.8%, 14%, and 12.6% of cases, respectively.

The remaining Robson groups each represented less than 6% of the total percentage distribution.

These findings will shed light on the distribution of obstetric risk factors across different age groups among pregnant women at Erebouni Medical Center. Understanding these patterns is crucial for tailoring obstetric care strategies to meet the diverse needs of pregnant women based on age and obstetric risk profiles

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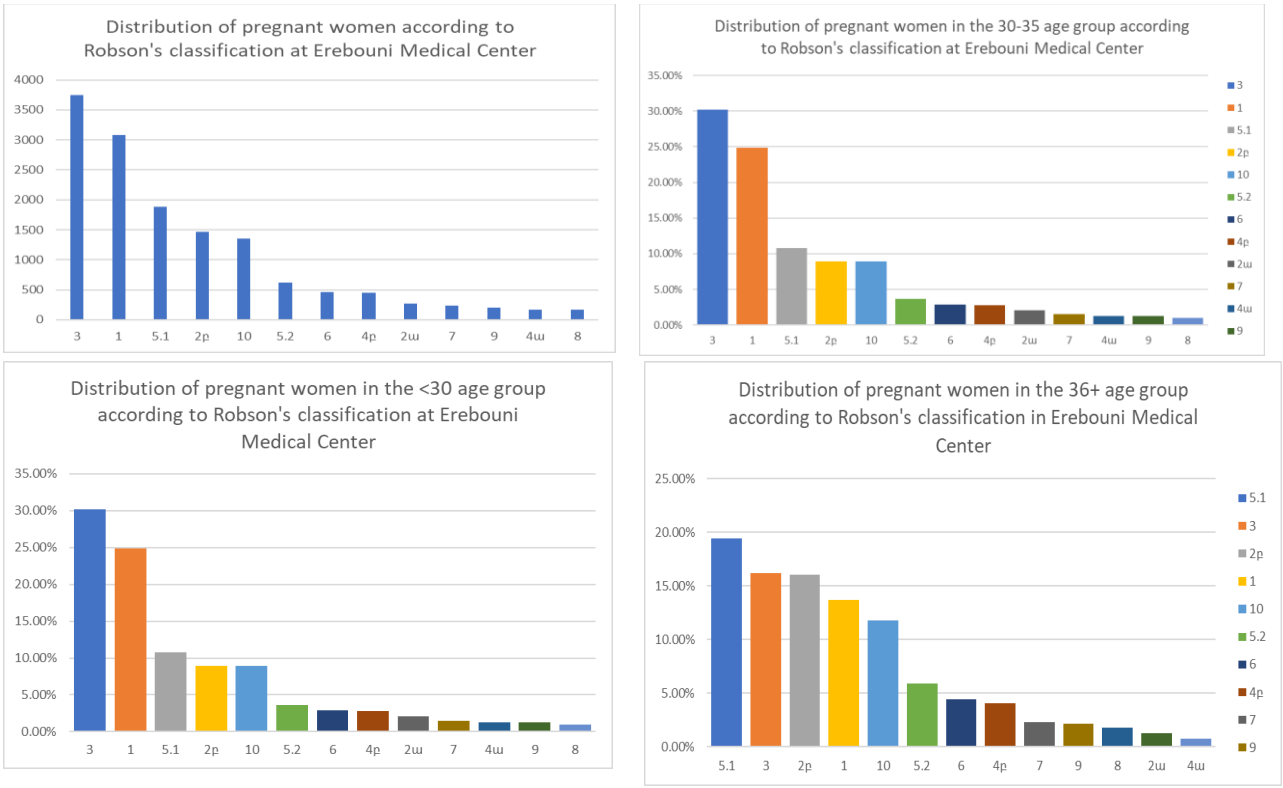

Figure 4. Structure of Pregnant Women at Erebouni Medical Center According to Robson's Classification and Age Groups (2018-2020)

Before conducting the respective analyses of the Robson classification groups, we first examined the birth indicators at Erebouni Medical Center, considering the method of delivery, gestational age, and age of the children (Figures 6-8). This preliminary investigation allowed us to gain insights into the diverse aspects of childbirth outcomes and demographics at the medical center.

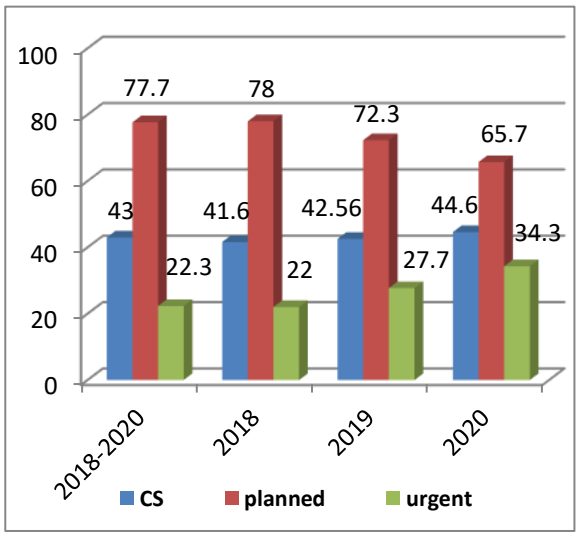

Figure 5. Birth Indicators at Erebouni Medical Center (2018-2020) by Method and Date of Delivery Across All Age Groups

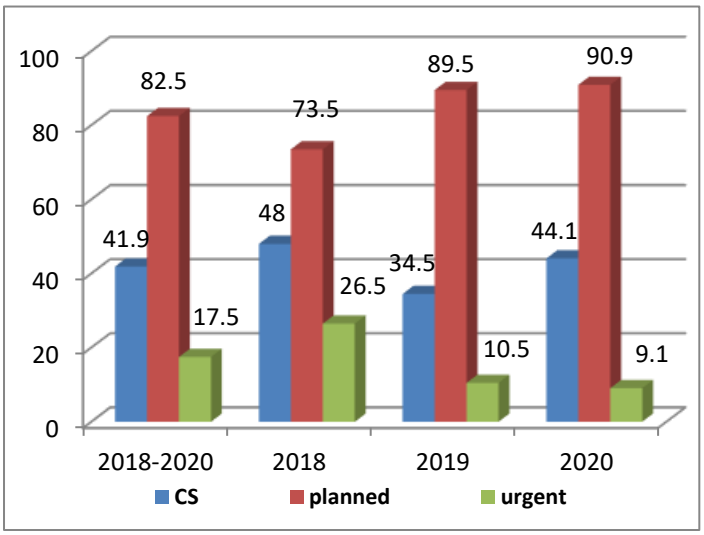

Figure 6. Birth Rates at Erebouni Medical Center (2018-2020) in the Age Group Under 30 by Method and Date of Delivery

As evident from the presented data (Figures 5-8), cesarean section (CS) frequency indicators between 2018 and 2020 averaged at 43%. Notably, during this period, there was an observed increase in these indicators, rising from 41.6% in 2018 to 44.6% in 2020. This escalation was particularly notable in urgent CS cases, surging from 22.3% in 2018 to 34.3% in 2020. Furthermore, the highest rates of CS were observed in the age group of 36 years and older, accounting for 67.4% of cases.

Further examination of CS indicators across age groups revealed distinct patterns. In the age group under 30, CS frequency indicators averaged at 41.9%. However, over the period of 2018-2020, there was a decrease in these indicators, declining from 48% in 2018 to 44.1% in 2020. This decline was accompanied by a notable decrease in urgent CS cases, dropping from 26.5% in 2018 to 9.1% in 2020. Additionally, there was a rise in planned or term CS, increasing from 93.5% in 2018 to 90.9% in 2020.

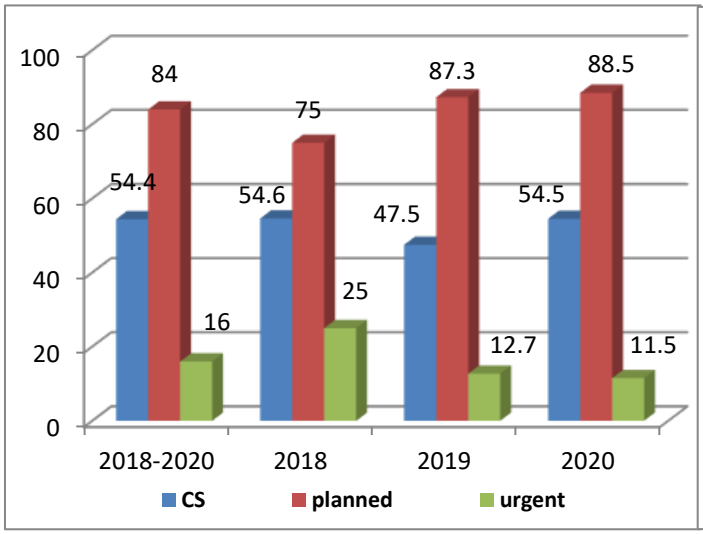

Figure 7. Birth Indicators at Erebouni Medical Center (2018-2020) in the Age Group 30-35 Years by Method and Date of Childbirth

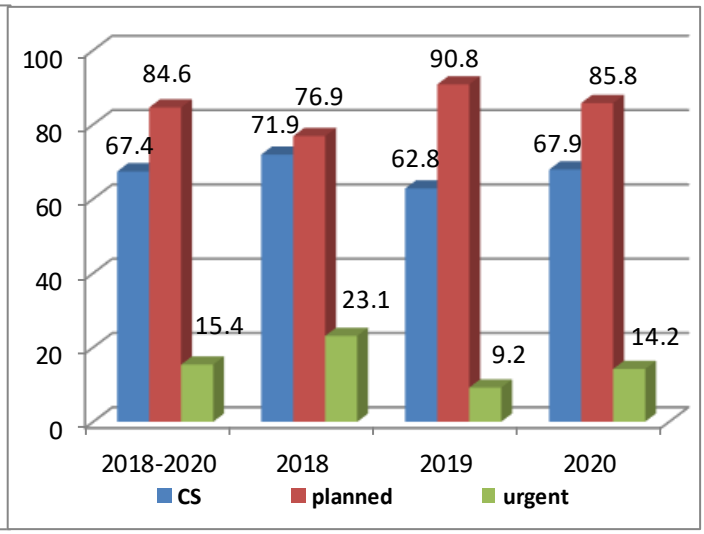

Figure 8. Birth Indicators at Erebouni Medical Center (2018-2020) in the Age Group 36+ Years by Method and Date of Childbirth

In the age group of 30-35 years, cesarean section (CS) frequency indicators averaged at 52.4%. Remarkably, between 2018 and 2020, these indicators remained relatively stable, exhibiting minimal change from 54.6% in 2018 to 54.5% in 2020, with a notable decrease recorded in 2019 to 34.5%. Within this age group, the data illustrate a decline in urgent CS cases, dropping from 25% in 2018 to 11.5% in 2020, alongside an increase in planned or scheduled CS, rising from 75% in 2018 to 88.5% in 2020.

In the age group of 35 years and older, CS frequency indicators were notably higher at 67.4%. Across the years 2018 to 2020, a slight decreasing trend in these indicators was observed, declining from 71.9% in 2018 to 67.9% in 2020. This trend coincided with a decrease in urgent CS cases from 23.1% in 2018 to 14.2% in 2020, while planned or scheduled CS increased from 76.9% in 2018 to 85.8% in 2020.

In the subsequent phase of our research, we examined the frequency indicators of cesarean sections (CS) at Erebouni Medical Center from 2018 to 2020, categorized according to the Robson classification across all age groups (ages 3-5).

Tables reveal that during the investigation period, the majority of CS cases among newborns at Erebouni Medical Center were concentrated within specific Robson groups. Notably, the following groups exhibited particularly high CS rates: Group 6 - 97.5%, Group 2b - 97.2%, Group 4b - 95.8%, Group 7 - 95%, Group 5.1 - 93.1%, Group 5.2 - 91.1%, and Group 8 - 86.1%.

Among individuals under 30 years of age, Groups 2b - 96.7%, Group 6 - 96.1%, Group 9 - 95.1%, Group 4b - 95%, Group 7 - 93.3%, and Group 5.1 - 91.3% demonstrated notable prevalence of CS. It's worth noting that only in Group 4b, 22.2% of CS cases were attributed to premature or emergency births, while in other groups, CS procedures were predominantly planned. Across various Robson groups, a tendency towards decreased CS rates in 2020 compared to 2018 was observed in Groups 1, 3, 4b, 5.1, 9, and 10. For instance, there was a decrease of 14.9% in Group 1, 31.2% in Group 3, 100% in Group 4b, and so forth.

Among individuals aged 30-35 years, Groups 6 - 98.1%, 2b - 97.5%, 9 - 97.1%, 4b - 96.9%, 7 - 95.1%, and 5.1 - 93.1% exhibited predominant CS rates. Similar to other age groups, a trend of decreasing CS rates from 2018 to 2020 was observed in several Robson groups.

For those aged 36 years and older, CS predominated in Groups 6, 7, 8, 9 - 100%; 5.2 – 98.1%; 5.1 - 97.4%; 2b - 97.9%; and 4b - 95.8%. Similar to other age groups, a tendency towards decreased CS rates in 2020 compared to 2018 was noted in several Robson groups. Interestingly, in 2020, an increase in CS indicators was recorded across all age groups in the remaining Robson groups, suggesting a complex interplay of factors influencing CS rates over the study period.

Discussion:

The findings of this study shed light on the cesarean section (CS) rates in Armenia, particularly within the context of a 3A-level hospital, Erebouni Medical Center. The escalating trend in CS rates observed globally is reflected in the Armenian context, as evidenced by the rise from 41.6% in 2018 to 44.6% in 2020 at Erebouni Medical Center. This increase is particularly notable in urgent CS cases, indicating potential areas for intervention to optimize obstetric care practices and mitigate unnecessary surgical interventions.

The analysis of CS rates according to age groups reveals intriguing patterns. Among individuals under 30 years old, while the overall CS rates decreased from 48% in 2018 to 44.1% in 2020, there was a significant decline in urgent CS cases alongside a rise in planned or term CS. Conversely, for those aged 30-35 years, CS rates remained relatively stable, with a slight decrease observed in 2019. However, there was a notable increase in planned or scheduled CS during this period. Among individuals aged 36 years and older, although CS rates remained high, there was a slight decreasing trend, with a decrease in urgent CS cases and an increase in planned CS.

The examination of CS rates according to Robson classification groups provides further insights into the specific obstetric populations driving the CS trends. Notably, certain Robson groups, such as Group 6, 2b, and 4b, consistently exhibited high CS rates across all age groups. Understanding the factors contributing to the high CS rates within these groups is crucial for developing targeted

interventions to optimize obstetric care practices and improve maternal and neonatal outcomes.

Overall, this study underscores the complexity of factors influencing CS rates in Armenia and the importance of tailored interventions to address specific obstetric populations. By leveraging the Robson classification system and conducting comprehensive analyses, healthcare professionals can better understand the drivers of CS trends and implement evidence-based strategies to optimize obstetric care delivery.

Ethics

Ethics Committee Approval: This study adhered to the Helsinki Declaration on Human Subject Research and was authorized by the Ethics Committee of Erebouni medical center (date: 28/09/2021, approval no: 12).

Informed Consent: Each participant provided their signature on a written informed consent document.

Authorship Contributions

Ghukasyan N.N.: Conceptualization, Methodology, Data curation, Formal analysis, Investigation, Writing - original draft, Writing - review & editing, Visualization.

Conflict of Interest

No conflict of interest was declared by the author.

Financial Disclosure

The author declared that this study received no financial support.

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