Determinants of over and underuse of caesarean births in the Eastern Mediterranean Region: an updated review

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Abstract

Background: The World Health Organization (WHO) Eastern Mediterranean Region shows a huge disparity in caesarean birth (CB) practice among its 22 Member States. Little research has been conducted at the Regional level to determine the underlying causes.

Aims: To explore the available evidence on key determinants of high and low CB rates in the Region.

Methods: A scoping literature review was performed. We searched PubMed and Medline with keywords “determinants of caesarean birth/caesarean section” and “caesarean birth/caesarean section trend” in the Region during 2000–2017. We included cohort studies, case–control studies, systematic reviews and reviews published in peer-reviewed journals. Latest data about demographics and socioeconomic indicators of maternal and child health care were extracted from demographic health surveys and situational analyses from Member States and WHO Statistics 2015. Fifty-seven of 395 studies met the inclusion criteria. These determinants were discussed in a conceptual framework based on Andersen’s Behavioral Model of Health Services Use, 2001.

Results: Lack of access to facility-based delivery and absence of skilled birth attendants were mainly responsible for the low CB rate in the Region. Social, cultural, individual and institutional factors affecting women’s choice for childbirth have contributed to the high CB rate.

Conclusion: A multidimensional approach is required to explore these determinants to optimize the Regional CB rate. Further qualitative studies are needed to investigate how these factors affect choice of birthing process in specific cultural settings in the Region.

Citation: Jadoon B; Mahaini R; Gholbzouri K. Determinants of over and underuse of caesarean births in the Eastern Mediterranean Region: an updated review. East Mediterr Health J. 2019;XX(x):xxx–xxx. https://doi.org/10.26719/emhj.19.033

Received: 22/10/17; accepted: 05/07/18

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**Introduction**

In 1985, the World Health Organization (WHO) set an optimal rate of 10–15% for caesarean birth (CB) to optimize maternal and child health, with the aim of reducing the disparity in CB rates among countries (1). Despite all the evidence regarding the risks and benefits of CB, there are still worldwide variations in its practice (2). The WHO Eastern Mediterranean Region is no exception to this, which has a maternal mortality rate of 166/100 000 live births (3). There is huge discrepancy in CB rates among the 22 Member States in the Region. Egypt, Islamic Republic of Iran, and Lebanon have exceptionally high CB rates of 52%, 48%, and 46%, respectively, whereas Somalia and Afghanistan have extremely low rates of < 5% (Table 1) (4). Socioeconomic disparities among the Member States have influenced the uptake of health services by users but many believe that CB rate is affected by multiple contributing factors prevailing at individual, organizational and cultural levels. Numerous small studies have examined facility-based CB rates within the Member States (5–8). However, limited evidence is available on underlying determinants of CB trends both at national and regional levels. The health professionals, policy-makers, advisory bodies and public health communities have all expressed their concerns on this issue. The purpose of this paper is to review the available evidence on key underlying determinants of high and low CB rates within the Region.

**Methods**

A scoping literature review was performed to provide a descriptive analysis of the key factors responsible for extreme trends in CB rate in the WHO Eastern Mediterranean Region. The 22 Member States in the Region are classified into 3 groups based on the WHO recommended CB rate of 10–15% (Table 2) (4). We searched PubMed and Medline with keywords “determinants of caesarean birth/caesarean section” and “caesarean birth/caesarean section trend” in the Region during 2000–2017. To ensure that our search results were specific to the Region, we selected studies that included at least 1 Member State of the Region. We included cohort studies, case–control studies, systematic reviews and review articles published in peer-reviewed journals both at the national and international level. The initial search returned 396 studies, of which, 58 met the above mentioned study criteria.

The Islamic Republic of Iran had the highest number of studies that investigated CB rates, followed by Lebanon. Member States from Group 1 had the fewest studies and information about their demographics and socioeconomic indicators of maternal and child health care was extracted from their latest demographic health surveys (DHS), and health situational analysis reports. Relevant data for some Arab Member States [Qatar, Saudi Arabia, United Arab Emirates (UAE), Djibouti, Kuwait, Tunisia, Palestine and Libya] were taken from their latest family health surveys (9–16). For Qatar and Pakistan we used evidence from collective
review of their DHSs (1990–2013). The population-based CB rates for Member States were extracted from the World Health Statistics 2015 (4). The identified key determinants were categorized and discussed according to the framework of healthcare utilization based on Andersen’s Behavioral Model, first developed in 1968. It is the most widely acknowledged multilevel model that incorporates both individual and contextual determinants of health services use. The 3 major components of the model are predisposing factors, enabling factors and need factors (17,18) (Figure 1).

Results

Predisposing factors

Women’s age, education, parity, place of residence (urban/rural) and set of beliefs were identified as key predisposing factors responsible for the varying trend in CB rate in the WHO Eastern Mediterranean Region.

There was a positive association between maternal age at childbirth and having a caesarean section (CS). A review of 3 DHSs (1990–2002) from Jordan showed a positive association between maternal age ≥ 35 years at birth and having a CS (19). Similarly, in Egypt, Kuwait, Lebanon, Qatar, Syrian Arab Republic, West Bank and Gaza Strip, and Bahrain, there was a > 5% disparity in CB rates between older and younger women. In Kuwait, for example, the CB rate among women aged ≥ 35 years was 17.3% compared to only 4.8% among women aged 15–35 years. This was in contrast to the UAE, which had higher CS rates at younger ages, possibly due to the high rate of teenage pregnancy (20). A similar pattern was observed in Saudi Arabia; women aged ≥ 35 years had a CB rate of 11% compared with 7% for younger women (16).

The likelihood of CB was high among women with high educational status. Egypt, Islamic Republic of Iran and Lebanon had the highest CB rates in the Region. In Egypt, the prevalence of CB in women with secondary education (58%) was higher than in women with no education (37%) (21–23). Saudi women with university education had increased prevalence of CS compared with those who did not complete secondary school (10.5% vs 8.5%) (24).

High parity at birth was linked with an increase in repeat CB rate in Saudi Arabia and Iraq, where large families are the norm (25). This was in contrast to Egypt, where women with < 3 live births were twice as likely to undergo CB than women with higher parity (26). Evidence has suggested that high CB rate is common in women residing in urban areas. For example in Egypt, 60% of urban births were caesarean as compared to 48% in rural areas. The CB rate was also higher among women delivering in a private health facility than a government facility (66% vs 45%, respectively) (21). Member states that have higher rates of facility-based delivery have shown higher rates of CB. For example, Yemen and Sudan, with the
lowest level of CB rate have low levels of urbanization and the lowest institutional delivery rate in the Region of only 15.5%. This is in contrast to the Member States belonging to Groups 2 and 3 that have higher facility-based delivery rates and > 15% of CB rate. For example, in Bahrain the facility-based delivery rate is almost 100% (24).

Cultural norms and traditional health beliefs (e.g., attitudes toward health services, knowledge about disease, and cultural, social and family values) influenced women’s choice of CB. The patriarchal nature of society in the Region, where decisions are made by husbands, fathers and mothers-in-law, is responsible for women’s low decision-making power in seeking healthcare. In Group 1 Member States (Table 2), health-seeking behaviour is characterized by low confidence in modern medicine. The English word “surgery” means “slaughter” in Somali, which is believed to contribute to the fear that women have of dying or losing their child during CB (27). This trend was reflected in the Afghanistan mortality survey that showed that, although antenatal care from a skilled provider had increased to 68%, only 16% of women received ≥ 4 antenatal visits (the minimum necessary to provide adequate screening for pregnancy complications (28).

Enabling factors
Enabling factors include financial and organizational factors that enable women to access and utilize healthcare services (Figure 1). WHO Eastern Mediterranean Region Member States from Group 1 (Table 2) with low socioeconomic status had low prevalence of CB (< 5%). In Yemen, 98% of the women aged 15–49 years did not have any health insurance, and for specialized treatment like surgery, they spent up to a quarter of their annual household expenditure (29). In contrast, 14 Member States with CB rates > 15% were mainly high- and middle-income countries.

However, the relationship with socioeconomic status was not as straightforward as it seems. For example, Egypt, Islamic Republic of Iran, and Lebanon are all middle-income countries and had higher CB rates of 52%, 48%, and 46%, respectively, than Oman, Saudi Arabia, Kuwait and UAE had; all of which had better socioeconomic profiles (24). Such differences in the CB rate due to socioeconomic status have also been highlighted in individual Member States that have the highest rate of CB. For example, according to the 2014 DHS of Egypt, two thirds of births among women in the highest wealth quintile were caesarean deliveries compared to 38% among women in the lowest wealth quintile (21).

Similarly, the CB rate was significantly higher in Beirut–Mount Lebanon zone (high socioeconomic class with good access to health care) than in the rest of Lebanon (13.4% vs. 7.6%) (22). A similar pattern was observed in the Islamic Republic of Iran, with increased CB rate among women with high socioeconomic status (30). In contrast, another study in the Islamic Republic of Iran showed that, despite the obvious difference in total CB rate between
various socioeconomic classes, there was no significant difference in socioeconomic status in nonemergency CB. The prevalence of elective CB has risen from 1.8% to 47.4% in the very poor to medium socioeconomic classes, showing that many other factors play an important role in the CB trend (31).

Organizational factors include variables such as the care process, human resources, capacity to provide safe CB and blood transfusion, and infrastructure of healthcare organizations. Various authors have established a strong link between the type of the health care facility (private/ government) and CB rate. According to a meta-analysis on prevalence and causes of CB in the Islamic Republic of Iran in 2014, private institutes had higher CB rates, reaching up to 87% in some cases (23). The CS rate in private hospitals (77.9%) in Iraq was markedly higher than the rate in public hospitals (29.3%) (32). Lebanon, Jordan and Egypt had similar trends and suffered from dominance of the private health sector (19,33–35). Egypt had a 60% facility-based delivery rate in private hospitals that undermines the authority of government sectors to standardize obstetric care (35). This is in contrast to Yemen, which had a low facility-based delivery rate, where only 1 in 10 births took place in private health facilities (29).

The low rate of CB among Member States in Group 1 is a reflection of low access to comprehensive emergency obstetric and neonatal care (EmONC) that includes all basic emergency obstetrics and neonatal care signal functions (mainly life-saving steps for mother and baby at birth) plus CB and blood transfusion (36). A DHS from Yemen in 2013 showed that 42% of maternal deaths occurred at home, or in a relative’s home and 19% on the way to a health facility, in comparison to 39% that took place in a health facility. The main reasons cited for home delivery were cost (25%), distance to travel (24%) and poor treatment by health providers (9%) (29).

The shortage of skilled birth attendants (accredited midwives, doctors, nurses and obstetricians) was highlighted as a major barrier to achieving high rates of facility-based delivery in low-income countries. According to the latest data, only 20% of births in Sudan, 45% in Yemen, 46% in Afghanistan and 9.4% in Somalia were attended by skilled birth attendants (37). These countries exhibited correspondingly high maternal and neonatal mortality rates. The Member States with high CS rates lacked structured midwifery programmes that are essential to promote normal labour during childbirth. The resulting over-medicalization of normal labour can increase the risk of having a CB. A systematic review using the national data of African countries showed that skilled delivery attendance in Egypt, Tunisia, Djibouti and Libya was associated with significant reduction of maternal, fetal and neonatal mortality (38).
Uptake of CB is supply induced and thus strongly dependent on the capacity of healthcare systems to provide safe emergency obstetric services. A cross-sectional study in Afghanistan on availability and utilization of EmONC at 78 first-line referral facilities showed that 42% of peripheral facilities did not perform all 9 signal functions required for comprehensive EmONC, and treated only 20% of women expected to experience direct complications (39). Situational analysis of reproductive health in Somalia in 2009 indicated that for facility-based deliveries in hospitals, quality of care was low, either lacking or with outdated protocols for standard interventions during normal childbirth, such as the use of oxytocic drugs (40).

**Need factors**

Need for CB is when the expected health benefits to the mother and her baby outweigh the potential risks. This risk–benefit analysis is likely to be context dependent, since the safety of CB and its available alternatives varies across settings (41). According to Andersen’s Behavioral Model both perceived and evaluated needs affect health service use (Figure 1). The perceived need for CB (how women and caregivers view the need for CB) is commonly associated with women’s common misconception that CB is safer than vaginal birth for the baby (21). Women in Lebanon and the Islamic Republic of Iran blamed fear of pain during vaginal birth as a major factor in opting for CB (23,42). A study conducted in Iraq showed that 11% of CSs in a public hospital in Baghdad were conducted for nonmedical reasons such as fear of vaginal delivery (45.7%), avoiding delivery pain (14.3%) and a wish to have tubal ligation at the same time (8.6%) (43). Clinicians perceived that the need for women to have a CB was due to their fear of litigation, time convenience and financial gain, which contributed to exceptionally high CB rates in the Islamic Republic of Iran, Lebanon and Egypt (31,33,35).

The evaluated need represents objective measurement of women’s health status and their need for medical care. The global cost of the needed CSs in 2008 was estimated to be US$ 432 million. If all the resources currently devoted to excess CSs could be directed towards countries where additional procedures are needed, the needed procedures could be fully financed (44). Among WHO Eastern Mediterranean Region Member States in Group 3 (Table 2), previous CB (36.29% average) and fetal distress (18.86% average) were the major reasons for CS performed for clinical–midwifery reasons in the Islamic Republic of Iran (23). In Jordan, Egypt and Oman, previous CB, fetal malpresentation, failure to progress in labour, fetal distress, twins and preterm delivery were common clinical indications for performing CS (45–47). Obesity, which has shown an increased prevalence in women in the Region, has also shown a significant positive association with CB rate in Member States like Iraq that have a high prevalence of high body mass index (48, 49). Obstructed labour and fetal malpresentation are the most prevalent indications for CB among Member States that lack access to caesarean delivery (50).
Discussion
This review highlights inequalities in access to and use of CB among the Member States of the WHO Eastern Mediterranean Region. Member States in Group 3 (Table 2) with high CB rates are mostly middle- and high-income countries. Egypt, Lebanon, Islamic Republic of Iran, Jordan and Pakistan have doubled their CB rates in the last decade (20, 51). Women’s wealth index in these Member States has been strongly associated with their tendency to have a CB. CB rates ranged from 5.5% in the poorest women to 35.3% in the richest according to the latest review of 3 DHSs in Pakistan (1999–2013) (51). This observation is in line with the evidence provided by other studies indicating that CB is more likely in privately insured women as compared with women with public health insurance. Financial incentives associated with private insurance may encourage healthcare providers to perform more CBs (52).

However, when this relationship was further explored, the CB preference among women in the high-wealth quintiles was linked to their misconception that CB is less painful for the mother and safer for the baby as compared to vaginal birth (21,24,53). This is despite the evidence endorsed by internationally recognized bodies such as WHO, National Institutes of Health, and American College of Obstetricians and Gynecologists that CB is associated with adverse maternal and neonatal outcomes (54, 55). In the present review, women’s education emerged as a strong predictor of CB; a finding consistent with many other studies (23,51). However, when confounders like age, marital status and parity were adjusted, the influence of high educational status was reversed and more-educated women were less likely to have a primary CB with weak clinical indications (56). Women were more likely to give birth with a skilled attendant present, and therefore more likely to survive childbirth. We may conclude that perhaps socioeconomic status of the country is a more important determinant of CB rate than the women’s individual socioeconomic characteristics.

Clinicians’ preference for CB has significantly influenced women’s decision to choose CB. The clinicians’ role in over-medicalization of normal labour, and their tendency to take advantage of women’s concerns about potential complications of childbirth, has been highlighted in various studies. Many clinicians believe that the lower tariff set for specialists in charge of vaginal birth increases their tendency towards performing CBs (33). Apart from financial incentives, practice of defensive medicine and professional convenience factors have urged clinicians to offer planned CB to women (57,58). Lack of evidence-based guidelines regarding childbirth practice at national level and profit-motivated institutional settings, especially in the private sector, are leading to high CB rates. Reduced midwifery input in childbirth has led to a gradual shift from hospitals (labour in a comfortable place with trusted people and supporting companion) to high technology and time-limited obstetrics practice (if delivery is not within a given time frame, then CS is performed). This increases the anxiety of both physicians and mothers, with increased tendency towards CB (59).
Evidence regarding the effect of demographic factors like increased maternal age, place of residence, place of birth, parity and obesity on high CB rates in the Region is inconsistent. Older women have an increased risk of fetal anomalies and maternal diabetes and hypertension, which has resulted in an increase in CS in the Region. Also, fertility treatment is higher among older women, so they have a greater risk of pregnancy complications, leading to increased rate of CS. This observation is in line with studies conducted in other parts of the world (60). We found a high CB rate in women with obesity, which was consistent with the evidence that obese women were 6 times more likely than nonobese women to have CB due to cephalopelvic disproportion or failure to progress in labour (47, 61).

The most common evaluated need for women to have CB was a previous history of CB. This is in contrast to other developed countries where attempted vaginal birth is offered as an acceptable, safe approach in women with a history of CB. In Lebanon such safe practice accounts for only 7% of deliveries. Such a low rate of attempted vaginal birth indicates that women who undergo primary CS are more likely to go through repeated CSs in Lebanon due to the refusal of most physicians to perform a vaginal birth after CS (33). The increased incidence of clinical indications for CB could be a sign of serious health concerns among women but these indications must be properly evaluated and monitored by the standard WHO Robson Classification to determine their true contribution (62). High CB rate with no major improvement in maternal and neonatal health reflects the fact that women undergoing CS are not the ones who need it most.

Evidence from Group 1 Member States (Table 2) revealed that shortage of skilled birth attendants and low access to safe CB are the 2 main factors contributing to low CB rates (38). A systematic review explored the relationship between maternal and neonatal mortality and deliveries attended by skilled health personal (including CB) in 41 African countries (38). This showed that an increase in CB rate (probably indirectly an increase in proportion of skilled person attended deliveries) was correlated with a reduction in maternal mortality rate. Similar regression lines were observed in the correlation analyses of stillbirth and neonatal mortality rates with the CB rate.

Multiple nonclinical factors (e.g., education, income, culture, religion, geographic inaccessibility, and lack of transport) also contributed to the high maternal and perinatal mortality. Consistent with prior studies in low-income countries, our findings showed that lack of women’s empowerment for their health issues resulted in inappropriate health-seeking behaviour. The traditional home health practice with prayers and extra help from traditional healers was classed as their first option. Other studies claimed that 88–99% of maternal deaths could be avoided if women were able to reach existing emergency obstetric
care rapidly (63). Even if one can overcome the access factor, most facilities in the Member States do not have sufficient surgical capacity for a procedure like CB, which is consistent with findings from low-income countries in other regions (64). Lack of CB services is known to increase the risk of maternal and fetal complications due to obstructed labour (65). In Afghanistan, 79% of facilities in the observed time period provided CB, but only 74% provided blood transfusion. The facilities cited lack of human resources (77%), lack of equipment and/or supplies (31%), and need for training (15%) as the main reasons for not performing CBs (39).

The policy implications of our findings are as follows. CS rate is an important indicator of accessibility to emergency obstetric care. To strengthen universal health coverage and equity in maternal health care it is important to optimize the CS rate. Therefore, detail knowledge of underlying determinants of high and low CB rates in the Region is crucial for policy-makers to suggest the appropriate evidence-based interventions. This review highlights the complex nature of these determinants, suggesting that a multidimensional approach will be required in future through collaborative work between various sectors for optimization of CB rates.

Unlike most publications focusing on 1 extreme of the CB trend in the Region, our review provides a descriptive analysis of the underlying determinants of over- and underuse of CB in the Region. Although it was not an exhaustive review, we focused on papers that reported studies from the Region. In this process, however, we were challenged with the significant lack of good quality research on CB trends and their underlying determinants. The data from Group 1 Member States were limited in terms of quantity and quality; therefore, we relied on the information available from their respective health surveys. Most of the studies from other Member States were also small facility-based studies as opposed to population-based studies that would have given a better representation of the whole population.

In conclusion, our review highlights the inequity in the use of CB among Member States of the Eastern Mediterranean Region. Lack of access to facility-based delivery and absence of skilled birth attendants during childbirth were the major underlying factors for the suboptimal CB rate in the Region. In contrast, the social, cultural and institutional factors, mainly affecting women’s choice for CB, contributed to the higher CB rate in Member States in Groups 2 and 3 compared to Group 1. Further, carefully designed, qualitative studies are needed to explore how these factors affect the choice of birthing process in specific cultural settings of this Region. The country-specific factors should be taken into account for future studies to give a better understanding of these determinants.

**Funding:** None.

**Competing interests:** None declared.
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<table>
<thead>
<tr>
<th>Predisposing factors</th>
<th>Enabling factor</th>
<th>Need factors</th>
<th>Use of health services (CB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sociodemographic variables</td>
<td>Financial</td>
<td>Perceived</td>
<td>(how women and caregivers view the need for caesarean birth)</td>
</tr>
<tr>
<td>• Age</td>
<td>• Individual level (income, wealth including the health insurance at an individual disposal to pay for health services)</td>
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<tr>
<td>• Education</td>
<td>• Contextual level (resources available, rate of health insurance coverage and health care expenditure.</td>
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<td>• Family size</td>
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<td>• Place of residence</td>
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<td>Health Beliefs</td>
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<tr>
<td>Organizational</td>
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<tr>
<td>• Individual (means of access, transportation, travel time to and waiting time for health services)</td>
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<td></td>
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<tr>
<td>• Contextual (amount varieties, structure, distribution of health services facilities, health policies, and availability of personnel)</td>
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</tbody>
</table>

Figure 1. Sociobehavioural model of health service use (Andersen’s Behavioral Model 1968). CB = caesarean birth.
Table 1. CB (%) rates, maternal mortality (/100 000 live birth rate) and neonatal mortality rates in Eastern Mediterranean Region

<table>
<thead>
<tr>
<th>Country name</th>
<th>2015 MMR/100 000</th>
<th>2015 NMR/1000</th>
<th>CS rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 AFG</td>
<td>396</td>
<td>36</td>
<td>4</td>
</tr>
<tr>
<td>2 BAA</td>
<td>15</td>
<td>1</td>
<td>26</td>
</tr>
<tr>
<td>3 DJI</td>
<td>229</td>
<td>33</td>
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<tr>
<td>4 EGY</td>
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<td>52</td>
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<tr>
<td>5 IRA</td>
<td>25</td>
<td>10</td>
<td>48</td>
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<tr>
<td>6 IRQ</td>
<td>50</td>
<td>18</td>
<td>22</td>
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<tr>
<td>7 JOR</td>
<td>58</td>
<td>11</td>
<td>28</td>
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<tr>
<td>8 KUW</td>
<td>4</td>
<td>3</td>
<td>12</td>
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<tr>
<td>9 LEB</td>
<td>15</td>
<td>5</td>
<td>46</td>
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<tr>
<td>10 LIY</td>
<td>9</td>
<td>7</td>
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<td>19</td>
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<td>15 QAT</td>
<td>13</td>
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<td>18 SUD</td>
<td>311</td>
<td>30</td>
<td>7</td>
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<tr>
<td>19 SYR</td>
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<td>7</td>
<td>21</td>
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<tr>
<td>20 TUN</td>
<td>62</td>
<td>8</td>
<td>27</td>
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<tr>
<td>21 UAE</td>
<td>6</td>
<td>4</td>
<td>24</td>
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<tr>
<td>22 YEM</td>
<td>385</td>
<td>22</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 2. WHO Member States divided into 3 groups according to the WHO recommended CB rate (10–15%)

<table>
<thead>
<tr>
<th>CB rates</th>
<th>Countries in Eastern Mediterranean Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 10%</td>
<td>Group 1: Afghanistan, Somalia, Sudan, Yemen (18%)</td>
</tr>
<tr>
<td>10–15%</td>
<td>Group 2: Djibouti, Kuwait, Pakistan (14%)</td>
</tr>
<tr>
<td>&gt; 15%</td>
<td>Group 3: Bahrain, Egypt, Jordan, Iraq, Islamic Republic of Iran, Lebanon, Libya, Syrian Arab Republic, Tunisia, Palestine, Saudi Arabia, Morocco, Oman, United Arab Emirates (68%)</td>
</tr>
</tbody>
</table>

*CB = caesarean birth; WHO = World Health Organization.*