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Analysis of the 2017-18 Jordan Population and Family Health Survey (JPFHS) Data

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ABSTRACT

Cesarean sections (C-sections) are surgical procedures that save maternal and infant lives. In some cases, C-sections are done when they are not necessary, while in other cases, some women are unable to access this life-saving intervention. Sociodemographic characteristics are associated with an increased use of C-section. Disparities in socioeconomic status and other factors exist in the rates of C-sections across diverse populations worldwide. Although C-sections are common in Jordan, there is limited evidence about the characteristics associated with C-sections. We aim to assess the factors related to the use of C-sections and to examine the sociodemographic disparities of these deliveries in Jordan.

We analyzed data from the 2017-18 Jordan Population and Family Health Survey, which is the seventh to be conducted in Jordan. The analysis included a total of 6,525 women age 15-49 who delivered their most recent birth in a health facility in the 5 years before the survey. Statistical analyses used descriptive, bivariate, and logistic regression methods.

The results show that 27% of women were delivered by C-sections. C-section is significantly associated with older age groups, region, and place of delivery. No significant differences were found by wealth status, place of residence, educational level, employment, nationality, decision making on health, or health insurance. The odds ratio of C-section use for women age 40 and over is 3.3 (CI 2.0-5.5), compared to women under age 20. The odds of having a C-section is 40% higher for women who delivered in a private hospital compared to women who delivered in a public hospital (CI 1.2-1.8). The odds of C-section are 60% lower for women in Aqaba compared to women in Amman (CI 0.3-0.6), and 60% higher for women in Madaba compared to the women in Amman (CI 1.2-2.1).

This study assessed factors related to C-section among Jordanian mothers. Our findings highlight the increased practice of C-section in the private sector, and suggest the importance of developing national and subnational policies that include clear guidelines for performing C-sections, especially in the private sector.

KEY WORDS: C-section, Jordan, JPFHS, cesarean, inequality, women

1 INTRODUCTION

1.1 Background and research questions

Cesarean sections (C-sections) can be a key requirement for safe childbirth. The rates of C-section deliveries are increasing worldwide. In developing countries, successful public health interventions that reduce maternal and neonatal mortalities and improve access to maternal health services have led to an increase in C-sections (Gebremedhin 2014). However, there are concerns that C-sections may pose an increased risk of maternal and neonatal health consequences. The risks of C-section mortalities and/or morbidities are greater in low- and middle-income countries (LMICs). This may be due to inadequate obstetric care in terms of capacity to perform the surgery safely or to treat surgical complications appropriately (Wells, Wibaek, and Poullas 2019). Many LMICs lack the facilities and the financial or human resources required for achieving the best outcomes from such a major surgical procedure.

The World Health Organization (WHO) considers the ideal C-section rate to be between 10% and 15% (WHO 2018). This is based on evidence that showed an association between a reduced maternal mortality ratio (MMR) and neonatal mortality rate (NMR) when C-section rates rise toward 10%, and that C-section rates higher than 10% are not associated with reductions in maternal and newborn mortality rates. Nevertheless, many countries have exceeded this recommended threshold, particularly the LMICs (WHO 2018). This increase in C-sections has resulted in global concern. The WHO released a statement on C-section rates and provided a guideline on nonclinical interventions that can reduce unnecessary C-sections. The guideline's recommendations are targeted to women, health-care professionals, and health organizations, facilities, and systems (WHO 2018).

C-section should be performed when there is a risk to the mother or baby's life (WHO 2018). A systematic review of 22 studies from 18 countries in 4 continents found that the majority of reported indications for C-section are maternal indications followed by fetal indications. The most frequently reported C-section indications were cephalopelvic disproportion, fetal distress, prior cesarean, dysfunctional labor, and elective cesarean (Vega 2015). C-section rates are also associated with other factors such as maternal obesity (Nkoka et al. 2019) and multiple pregnancies (Department Of Statistics Jordan and ICF 2019). In addition, increased maternal age and diabetes mellitus (Patel, Peters, and Murphy 2005) were also found to increase the odds of C-section. Differences in the style of professional practice and increased fear of medical litigation, as well as organizational and health system factors, have also been implicated in the use of C-section (Al Rifai 2017). Goyert et al. (1989) and De Muylder and Amy (1993) had previously reported that individual practice style might be an important determinant in the use of C-section by obstetricians. Moreover, Khawaja and Al-Nsour (2007) argued that country-specific standards of practice, convenience of delivery, fear of litigation, and profitability may have contributed to an increasing rate of C-section.

Beyond medically related factors, there is evidence that social and economic factors are important determinants of C-section rates in a country. Changes in the characteristics of the population may contribute to high rates of C-sections. These include delayed age of marriage, delayed age at first pregnancy, and older age at birth, which have led to an increased number of high-risk pregnancies and may have encouraged couples and health professionals to seek C-sections and positive outcomes (Al Rifai

2017). Demographic changes, such as the place of residence, have also been associated with increased C-sections related to cultural context (Amjad et al. 2018). Jadoon, Mahaini, and Gholbzouri (2019) reviewed literature from the WHO Eastern Mediterranean Region to explore disparities in C-sections among its 22 member states. Jadoon et al. (2019) found that cultural norms and traditional health beliefs, including attitudes toward health services and cultural, social, and family values, influence women's choice of cesarean birth. For example, the patriarchal system in these regions, where decisions are made by husbands, fathers, and mothers-in-law, can be responsible for women's limited decision-making power in seeking health care (Jadoon et al. 2019). There have also been reported differences in the rate of C-sections between urban and rural residence (Feng et al. 2012; Suparmi, Kusumawardhani, and Susiloretni 2019; Kang et al. 2019).

Other researchers analyzed disparities in C-section deliveries within and between countries. There are disparities in C-section deliveries across and within African countries (Dankwah et al. 2019; Ushie, Udoh, and Ajayi 2019; Yaya et al. 2018), within middle eastern countries (Jadoon, Mahaini, and Gholbzouri 2019), and across LMICs (Boatin et al. 2018; Boerma et al. 2018). Underuse of C-section among poor women compared to overuse among rich women was reported in Ghana (Dankwah et al. 2019). Boatin et al. (2018), who studied the C-section rates of 72 LMICs, found that rates are higher and change faster among the rich, and that the disparity varies among countries.

The sustainable development goals (SDGs) have emphasized gender equality and women's empowerment (Goal 5) and reducing inequalities within and among countries (Goal 10). With women's empowerment, Qureshi and Shaikh (2007) found that the lack of control of Pakistani women over their own lives has a negative impact on their health and the health of their families. Pandey, Lama, and Lee (2011) in Nepal noted that women's empowerment is related to women's utilization of health-care services. To our knowledge, there are no available studies that address women's empowerment and health-care utilization in Jordan.

Jordan has one of the highest C-section rates in the Middle East. The most recent Population and Family Health Survey (JPFHS) shows that the C-section rate for all births is 26%, which is more than double the estimated rate by the WHO for an expected C-section rate in a population. The JPFHS report also shows a high ratio of planned to unplanned C-sections, which suggested that there might be a tendency toward unnecessary use of C-sections in Jordan (Department of Statistics Jordan and ICF 2019). In Jordan, there is some research on the levels and trends of C-sections, although research on the determinants is limited. A previous study from Jordan explored the levels and trends in the prevalence of C-section deliveries using DHS data from three surveys during 1990–2002. This study found an increase in the rate of C-section from 8.5% to 17.8% in 2002, with a slightly higher rates in private hospitals (Khawaja and Al-Nsour 2007). Nevertheless, our study is the most recent assessment of the C-section trends in Jordan, along with an investigation of variables that were not included in the previous studies such as women's responsibility for decision making.

Research on disparities in maternal health care and, more specifically, on the use of C-section among women in Jordan, is scarce. In addition to the evidence of socioeconomic disparities among women from different parts of the world, the displacement of many Syrian refugees to Jordan could add to the disparities by nationality. For example, one study found that C-section, anemia, lower weight of neonates, and lower APGAR scores were more prevalent among Syrian refugee women when compared to their

Jordanian counterparts (Alnuaimi et al. 2017). In contrast, a systematic review by Tappis et al. (2017) found that utilization of maternal health services was not different between Syrian refugees living in Jordan and Jordanian women.

Our research will assess the use of C-section and the sociodemographic disparities of the C-section delivery rate in Jordan.

The specific questions of this study are:

1. What are the main factors associated with the use of C-sections in Jordan among women age 15-49?

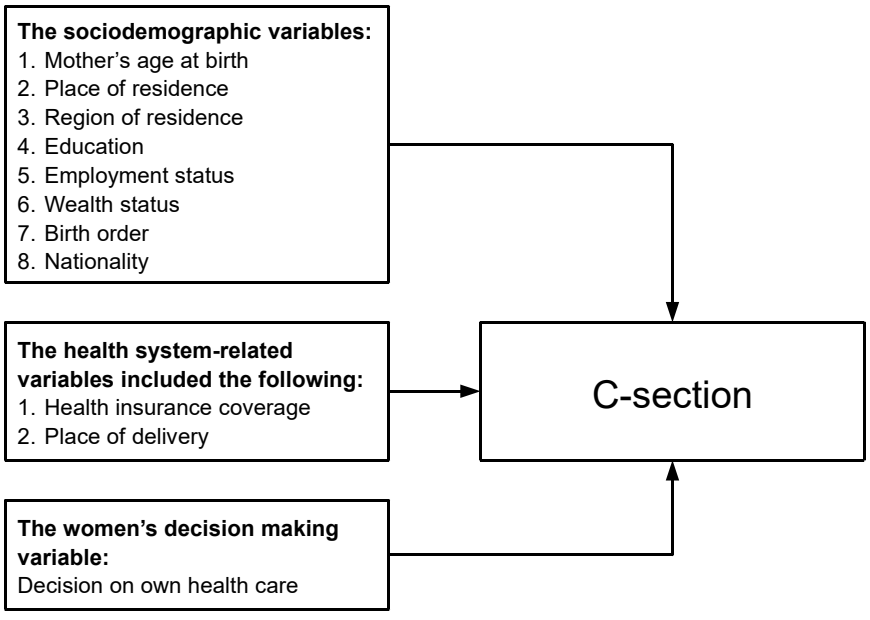
2. Are there disparities within the context of other social determinants of health related to C-section deliveries in Jordan?

1.2 Conceptual framework

Figure 1 shows the conceptual model for this study and describes the relationship between C-section and related nonclinical factors. In this model, the outcome is C-section use. The variables are categorized by the three factors identified in the literature as associated with the use of C-section: sociodemographic factors, factors related to health systems, and responsibility for decision making on health.

The sociodemographic factors include mother's age at birth, birth order, place of residence, region, education, employment, wealth status, and nationality. Health system factors include health insurance coverage and place of delivery. Women's decision making defines the responsible person who makes decisions on a woman's personal health care. These variables and the statistical examination of this conceptual framework are explained below.

Figure 1 Conceptual framework



2 DATA AND METHODS

2.1 Data

This study is based on data from the 2017-18 Jordan Population and Family Health Survey, which is the seventh to be conducted in Jordan (Department of Statistics Jordan and ICF 2019). The sampling frame was based on Jordan's Population and Housing Census frame for 2015. The JPFHS is representative of Jordan with data from Jordan's 12 governorates distributed over three regions (South, Central, and North). The data is also representative of urban and rural areas separately, and of three national groups: Jordanians, Syrians, and a group of other nationalities. A total of 14,689 eligible women age 15-49 were successfully interviewed for the survey.

Our study population included women age 15-49 who had a live birth in the 5 years before the survey and who delivered their most recent birth in a health facility. Women who did not deliver in the 5 years before the survey (n=7,389) and women who reported a noninstitutional delivery (n=106) were excluded. Since we are using decision making as a variable that is only asked of currently married women, we restricted our population to currently married women and excluded unmarried women (n=124). After weighting and excluding women with missing responses, the sample size for our study was 6,525 women.

2.2 Variables

2.2.1 Dependent variables

The dependent variable is C-section delivery among currently married women age 15–49 for their most recent birth in the 5 years before the survey. The variable used the responses to one question in the JPFHS: "Was (NAME) delivered by caesarean, that is, did they cut your belly open to take the baby out?" with a binary outcome of "yes" or "no" categories.

2.2.2 Independent variables

With our conceptual model, three sets of variables that are associated with C-section delivery were identified from empirical evidence. These are sociodemographic variables, health system-related variables, and variables of decision making.

The sociodemographic variables included the following:

1. Mother's age at birth defined as the age of the mother at the time of the birth and calculated by subtracting the date of birth of the individual woman respondent from the date of the child's birth. This was recoded into four categories of 10-year intervals: <20, 20-29, 30-39, and 40+.

2. Place of residence defined as either urban or rural.

3. Region of residence defined as the first administrative level within the country, as reflected in Jordan's 12 governorates.

4. Respondent's educational attainment defined in four categories: no education, primary, secondary, and higher.

5. Employment status recoded into two categories of employed and non-employed.

6. Wealth status index defined as the wealth status of the household, captured in five quintiles: poorest, poorer, middle, richer, and richest.

7. Birth order defined as the order number of the births from first to last and recoded into three groups: first birth, second to third birth, and fourth birth or more.

8. Nationality recoded into three categories of Jordanian, Syrian, and other. The other category includes Egyptian, Iraqi, other Arab nationalities, and non-Arab nationalities.

The health system variables included the following:

1. Health insurance coverage defined as the woman having any type of health insurance or not.

2. The place of delivery recoded into two groups of either private or public health facility.

The women's decision-making variable is defined as the person who usually makes decisions about the respondent's own health care. The variable is measured by asking the question: "Who usually makes decisions about health care for yourself: you, your husband, you and your husband jointly, or someone else?" This is recoded into four categories: respondent alone, respondent and her husband, husband alone, and others.

2.3 Statistical analysis

Data analyses were performed with Stata version 16.0 software. The data were weighted to account for disproportionate sampling and nonresponse. The analysis also adjusted for the effect of the complex survey design. The data analyses included descriptive and inferential statistics. The baseline socioeconomic, demographic, and other characteristics of respondents were computed with summary statistics and percentages. Bivariate analysis was performed to assess the relationship between the independent variables and the dependent variable using the chi-square test. The association between the independent variables and C-section among women was investigated with logistic regression. The results were presented with adjusted odds ratios (OR) with 95% confidence intervals (CI). A p-value of less than 0.05 was set for statistical significance.

3 RESULTS

3.1 Descriptive statistics of the respondents

A total of 6,525 women were included in this study. Table 1 summarizes the sociodemographic characteristics of currently married women age 15-49 who delivered their most recent live birth in a health facility in the 5 years before the survey. The percentage of women who delivered by C-section was 27%. Half of the sample (51%) were women age 20-29, 39% were between 30-39, 5% were age 40 or above, and 5% were younger than age 20. The majority of women (89%) reside in urban areas. Approximately 37% of the women live in Amman, the capital of Jordan, 19% in Irbid, the largest governorate of North Jordan, and 13% in Zarqa, a governorate of the Central Region of Jordan, while the rest were distributed across the remaining nine governorates. The majority of women were Jordanian (86%), while 11% were Syrian and 4% were other nationalities. The proportion with education beyond the secondary level was relatively high with more than half (53%) of the women having completed secondary education and 39% higher education. The great majority of the women were unemployed at the time of the survey (87%).

The results of the household wealth index show that 48% of women were in the poorer and poorest quintiles compared to 30% in the richer and richest quintiles. More than one-third of women (38%) had four or more births, while 42% had two or three births. Nearly 65% of the women delivered in public hospitals. The percentage of women with health insurance was 62%, while the remaining did not have any type of health insurance.

Regarding decision making, it was found that the decision is shared between a woman and her husband in most of the cases (69%), while only 23% of women make this decision by themselves.

Table 1 Percent distribution of women age 15-49 by selected sociodemographic characteristics (N=6,525) weighted, Jordan PFHS 2017-18

	%	N
Delivery by cesarean section		
C-section	27.2	1,772
Other	72.8	4,753
Mother's age at birth		
<20	5.2	336
20-29	50.7	3,309
30-39	39.0	2,545
>=40	5.1	334
Type of place of residence		
Urban	88.6	5,780
Rural	11.4	746
Region by governorate		
Amman	37.2	2,425
Balqa	5.1	330
Zarqa	13.2	860
Madaba	2.6	167
Irbid	19.3	1,259
Mafraq	7.3	474
Jerash	3.3	217
Aljoun	2.5	165
Karak	3.6	235
Tafilah	1.7	109
Maan	1.7	112
Aqaba	2.6	170
Educational level		
No education	1.3	88
Primary	6.2	406
Secondary	53.0	3,457
Higher	39.4	2,574
Employment		
Not employed	87.1	5,687
Employed	12.9	839
Wealth		
Poorest	24.2	1,581
Poorer	23.6	1,540
Middle	21.9	1,427
Richer	19.1	1,243
Richest	11.2	734
Birth order number		
First	19.4	1,265
2-3	42.3	2,760
4 and more	38.3	2,500
Nationality		
Jordanian	85.5	5,578
Syrian	10.6	692
Other	3.9	255
Person responsible for decision making on respondent's health care		
Respondent alone	22.5	1,469
Respondent and husband	69.2	4,514
Husband alone	8.1	529
Others	0.2	13
Place of delivery		
Public	64.6	4,216
Private	35.4	2,309
Health insurance coverage		
No	38.1	2,485
Yes	61.9	4,041
Total	100.0	6,525

Note: The women who had no births in the 5 years before the survey, women who did not have their delivery at a health institution, and women who are not currently married are excluded.

3.2 Cesarean section by characteristics of the respondents

Table 2 shows C-section by characteristics of the women. C-section deliveries were significantly different between age groups. Women below age 20 had the lowest rates of C-section compared to the other older groups. C-section rates did not differ according to birth order among women.

No significant differences in C-section use were found between women who reside in urban areas compared to the rural areas. However, a significant difference in C-section use was found among the different regions in Jordan. Madaba (a Central Region governorate) had the highest rate of C-section (35%), while Aqaba had the lowest rate (13%). The results also show no relationship between employment status and C-section. Comparisons of women with different levels of education show that although women with no education undergo C-section slightly more often (31%) than women of primary (28.5%), secondary (26%), or more highly (29%) educated groups, the results were not statistically significant. The use of C-section did not differ between Jordanian women and women of other nationalities.

3.3 Cesarean section use by health system and decision making

As shown in Table 2, C-section was found to be more common in private facilities (31%) than in public facilities (25%). However, there was no significant difference between insured women and uninsured women in the use of C-section. Our findings show that 49% of women had a C-section if the decision was made by others compared to 23-28% if the decision was made by the respondent alone, or by her husband or jointly. However, these differences were not statistically significant.

Table 2 Cesarean section use by characteristics of the respondents, Jordan PFHS 2017-18

	%	CI	p-value
Mother's age at birth			**<0.001**
<20	19.0	[14.1,25.1]	
20-29	25.0	[22.9,27.2]	
30-39	30.5	[27.9,33.2]	
>=40	31.6	[25.6,38.3]	
Type of place of residence			0.911
Urban	27.2	[25.5,28.9]	
Rural	27.0	[24.0,30.2]	
Region by governorate			**0.003**
Amman	27.0	[23.9,30.3]	
Balqa	29.5	[25.3,34.0]	
Zarqa	27.4	[23.5,31.6]	
Madaba	35.3	[30.7,40.2]	
Irbid	28.7	[25.1,32.7]	
Mafraq	27.5	[24.7,30.6]	
Jerash	26.6	[22.6,31.0]	
Aljoun	28.1	[24.2,32.4]	
Karak	22.8	[18.4,27.9]	
Tafilah	29.5	[25.5,33.9]	
Maan	19.4	[15.2,24.4]	
Aqaba	13.0	[10.3,16.3]	
Educational level			0.237
No education	31.3	[21.1,43.7]	
Primary	28.5	[22.8,35.0]	
Secondary	25.7	[23.7,27.8]	
Higher	28.7	[26.1,31.5]	
Employment			0.651
Not employed	27.0	[25.4,28.7]	
Employed	28.2	[23.6,33.3]	
Wealth			0.599
Poorest	26.3	[23.4,29.3]	
Poorer	28.5	[25.5,31.6]	
Middle	25.4	[22.4,28.7]	
Richer	29.2	[24.8,34.1]	
Richest	26.3	[20.8,32.6]	
Birth order number			0.221
First	29.2	[25.6,33.1]	
2-3	27.7	[25.3,30.2]	
4 and more	25.5	[23.1,28.1]	
Nationality			0.662
Jordanian	27.4	[25.7,29.2]	
Syrian	26.3	[22.2,30.9]	
Other	24.1	[17.4,32.4]	
Person responsible for decision making on respondent's health care			0.183
Respondent alone	28.3	[25.3,31.6]	
Respondent and husband	27.3	[25.4,29.2]	
Husband alone	22.5	[18.0,27.7]	
Others	49.0	[15.1,83.8]	
Place of delivery			**0.005**
Public	25.3	[23.5,27.2]	
Private	30.6	[27.6,33.7]	
Health insurance coverage			0.530
No	26.5	[23.9,29.3]	
Yes	27.6	[25.7,29.5]	
Total	27.2	[25.6,28.7]	

3.4 Factors associated with cesarean section use

Table 3 summarizes the results of the logistic regression analyses for C-section among the women in this study. We found that region, mother's age at birth, birth order, and facility type were significantly associated with C-section delivery.

Our analysis shows that the mother's age is significantly associated with C-section. Mothers who gave birth at age 30-39 and 40 and over had almost three times the odds of C-section delivery compared to mothers who were younger than age 20. The region where a woman resides was also significantly associated with C-section. The odds of C-section use are 60% lower for women in Aqaba compared to women in Amman (CI 0.3-0.6, $p<0.001$) and are 60% higher for women in Madaba compared to women in Amman (CI 1.2- 2.1, $p<0.01$). No other regions showed a significant difference in C-section compared to Amman. The study also found that the odds ratio of C-section for women with a 4th or higher birth order were 50% lower compared to women with a first-order birth (CI 0.4-0.7, $p<0.001$). No significant associations were found with C-section in relation to the women's place of residence, education, employment, wealth status, or nationality.

With the health system variables, facility type was a significant factor in relation to C-section. The odds of having a C-section were 40% higher for women who delivered in private hospital compared to women who delivered in a public hospital (CI 1.2-1.8, $p<0.001$). Health insurance coverage and women's decision making about her own health were not significantly associated with C-section.

Table 3 **Adjusted logistic regression for various factors on C-section among women age 15-49 who had a live birth in the 5 years before the survey, for the most recent birth, Jordan PFHS 2017-18**

	C-section	
Variable	**AOR**	**95% CI**
Mother's age at birth (Ref. <20)		
20-29	1.7**	1.1 - 2.7
30-39	2.9***	1.9 - 4.5
>=40	3.3***	2.0 - 5.5
Type of place of residence (Ref. Urban)		
Rural	1.0	0.8 - 1.2
Region by governorate (Ref. Amman)		
Balqa	1.3	1.0 - 1.7
Zarqa	1.1	0.9 - 1.5
Madaba	1.6**	1.2 - 2.1
Irbid	1.2	0.9 - 1.5
Mafraq	1.2	0.9 - 1.6
Jerash	1.1	0.8 - 1.5
Aljoun	1.1	0.8 - 1.5
Karak	0.8	0.6 - 1.2
Tafilah	1.2	0.9 - 1.7
Maan	0.8	0.5 - 1.1
Aqaba	0.4***	0.3 - 0.6
Education (Ref. None)		
Primary	0.9	0.5 - 1.7
Secondary	0.7	0.4 - 1.3
Higher	0.8	0.4 - 1.4
Employment (Ref. Employed)		
Not employed	0.9	0.7 - 1.3
Wealth (Ref. Poorest)		
Poorer	1.1	0.9 - 1.4
Middle	0.9	0.7 - 1.2
Richer	1.0	0.7 - 1.4
Richest	0.8	0.5 - 1.2
Birth order number (Ref. First)		
2-3	0.8	0.6 - 1.0
4 and more	0.5***	0.4 - 0.7
Nationality (Ref. Jordanian)		
Syrian	1.0	0.8 - 1.4
Others	0.8	0.5 - 1.3
Person responsible for decision making on respondent's health care (Ref. Respondent alone)		
Respondent and husband	1.0	0.8 - 1.2
Husband alone	0.8	0.5 - 1.1
Others	2.9	0.6 - 14.5
Place of delivery (Ref. Public)		
Private	1.4***	1.2 - 1.8
Health insurance coverage (Ref. No)		
Yes	1.1	0.9 - 1.3

AOR: adjusted odds ratio
*** p<0.001, ** p<0.01, * p<0.05

4 DISCUSSION

This study assessed the use of C-section in Jordan and examined the sociodemographic disparities of the rate of C-section delivery among Jordanian women age 15-49. The study was a secondary analysis of the JPFHS 2017-18. The data showed that 27% of currently married women age 15 to 49 reported C-section as the mode of delivery of their last birth within 5 years before the survey.

Our study showed that C-section deliveries were significantly different among age groups, with C-sections more common among older mothers than the younger mothers. This finding is consistent with previous JPFHS surveys from 2007 and 2012, when the rates of C-section increased with older mothers. Similar findings were reported in Egypt by Al Rifai in 2017. This might be related to a previous history of having a C-section in the older maternal age groups. Studies in Jordan report previous C-section to be a primary indicator for repeated C-section (Akasheh and Amarin 2000; Omar and Qudah 2007). Increased C-sections among older mothers are also commonly perceived as clinically driven because pregnancies at an older age are associated with medical complications (Dulitzki et al. 1998). Herstad et al. (2016) reported increased C-sections in Norway among women who were older than 35 who had low-risk pregnancies with their first baby. Similarly, an older study by Peipert and Bracken (1993) found that C-section rates increased with maternal age among groups of women with and without complications of pregnancy or labor. Another study reported that older primiparous women were at significantly increased risk of C-section delivery even when no complication were present (Gordon et al. 1991). Evidence from Jordan about the underlying factors for higher C-section among older mothers is needed.

Our analysis found a significant difference in C-section rates between different regions. Among the 12 governorates of Jordan, women living in Madaba reported the highest rate of C-section, while women living in Aqaba had the lowest rate. Previous JPFHS data from 2007 and 2012 reported Madaba to have the highest rates of births by C-section, 22.6% and 33.9% respectively. The lowest rates of C-section among births that varied across the years were in Mafraq (13.3%) in 2007 and Maan (19.7%) in 2012. These findings are difficult to explain given the lack of evidence on differences in obstetric health-care practice specific to each governorate. This would be an important topic for future research.

This study shows that place of delivery is an important determinant for C-sections in Jordan. We found a significantly higher number of women having C-sections for their last birth in private care facilities compared to the public facilities. This is consistent with other studies in Jordan (Batieha et al. 2017; HamdAllah 2018; Khawaja and Al-Nsour 2007). The high number of C-sections in the private sector might be explained by women's preferences to utilize private services. A qualitative study conducted in Jordan found that women tend to perceive private health-care services to be of higher quality compared to public health-care services and that women choose private health care over the public services, particularly for the antenatal care, although the higher costs of delivery in private hospitals can affect their choice of delivery in these hospitals (Alyahya et al. 2019). The private sector in Jordan is very active and is one of the main health-care providers, with 66 of the 116 total number of all sector hospitals (The Hashemite Kingdom of Jordan High Health Council 2016). Other reasons reported were the preference of women to choose C-section delivery due to fear of pain or the belief that C-section is safer (Al Rowaily, Alsalem, and Abolfotouh 2014; Kamal 2013; McCourt et al. 2007). These preferences might be

considered in the private sector, which in turn might result in more C-sections (Mehedi, Al-Diwan, and Al-Hadithi 2018).

The present study focused on disparities in the use of C-section among women in Jordan. In our study, there were no significant differences between mothers in relation to wealth status, place of residence, educational level, employment, or nationality. This is inconsistent with evidence from other studies (Al Rifai 2017; Cavallaro et al. 2013). Explanations might be found in context-specific analysis of the socioeconomic factors in Jordan. Nevertheless, reports show that Jordan's socioeconomic inequality levels are low compared to international standards (UNDP 2015).

This study has a number of strengths. First, the study used recent data from a nationally representative demographic and health survey in Jordan, which allows for generalizability of the study's results in the Jordanian context. Second, the study adds to the limited pool of evidence on the factors related to C-section in Jordan. However, since the JPFHS is a cross-sectional survey, we are unable to determine causality of the associations between the variables of interest. Another limitation is that we were unable to determine where and when women are not receiving necessary C-sections or where and when women are having C-sections that are unnecessary.

5 CONCLUSIONS

Overall, this study found the strongest predictor of C-section to be older maternal age at birth. C-sections are more prevalent in Madaba and are less prevalent in Aqaba. Higher numbers of C-section deliveries occurred in the private sector, which might reflect variation in practice between public and private providers. No significant differences in C-section were found by wealth status, place of residence, educational level, employment, nationality, decision making on health, or health insurance, which reflect low disparities in C-section performance among women in Jordan. This study highlights a need to identify where C-section is overused in Jordan and then to formulate strategies capable of controlling or regulating the performance of C-sections and reducing any unnecessary C-sections.

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