

# Predictors of Mode of Childbirth Based on Medicalized Maternal Care: A Cross-Sectional Study

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## Abstract

**Background:** Although there are studies that suggest a vast expansion of medicalization of pregnancy and birth in Iran, data about the rate of intervention applications caused by the medicalization in low-risk pregnancies and birth is limited. Moreover, there is limited information on the effectiveness of these interventions for different modes of childbirth.

**Objectives:** This study aimed to determine the rate of application of maternal medicalized care in low-risk pregnancies and births and to identify the factors that are associated with type of delivery.

**Patients and Methods:** This cross-sectional study was performed by stratified-cluster sampling on 320 postpartum women from four public and private hospitals in Mashhad, Iran. The data collection instrument was a designed and standardized tool for assessment of medicalized pregnancy and childbirth. Also, descriptive tests and logistic regression were used. A value of  $P < 0.05$  was considered statistically significant for all tests.

**Results:** In this study, the rates of natural vaginal and caesarean birth were 34.7% and 65.3%, respectively. Preconception and prenatal care received from an obstetrician were 72.8% and 51.6%, respectively. The median number of prenatal visits, laboratory examinations and sonography procedures was 12, 3 and 4, respectively. In 49.4% of the cases, the women were hospitalized before the onset of labor. Early admission (OR = 2.40; 95% CI = 1.93 - 2.97;  $P = 0.001$ ) and performing electronic fetal heart monitoring during admission (OR = 2.47; 95% CI = 1.28 - 4.73;  $P = 0.006$ ) were the interventions that the regression logistic analysis identified as associated with a higher rate of caesarean delivery.

**Conclusions:** It seems that obstetric interventions are widely applied in low-risk pregnancies and births. Some of these interventions have the effect of increasing the rate of caesarean delivery. According to the provided information, it seems that it is necessary to adjust health policy to provide appropriate care for low-risk pregnancies and births.

**Keywords:** Childbirth, Iran, Medicalization, Pregnancy

## 1. Background

“Medicalization is a process by which non-medical and social problems are defined and treated as medical problems” (1). Generally, women are more susceptible than men to the process of medicalization, and there are more cases related to women who have undergone medicalization. Among them, we can mention menstruation, birth control, sexual function, fertility, premenstrual syndrome, pregnancy and childbirth (2, 3).

With the improvement of maternal care, the risks associated with delivery have significantly decreased. This has provided a field for the medicalization of pregnancy and delivery (4). Certainly, delivery can also cause serious complications (5), and without a doubt one of the main goals of care during pregnancy and birth is a significant re-

duction of such risks (6). But, medicalization of maternal care, in turn, leads to increased reliance on health professionals, especially obstetricians and gynecologists (5), and the overuse of drug and technological and surgical procedures, as well as unnecessary, expensive, dangerous and invasive obstetrical interventions, in low-risk pregnancies and births (7).

In 2001, prenatal care was the fourth main reason for physician office visits, and about 20 million visits were made for this purpose in the U.S. (6). Conrad estimated (based on data from 2005) that the cost of 12 medicalized conditions in the United States was \$77.1 billion annually (8). This can lead to a waste of resources. Due to resource limitations in developing countries, this causes serious problems for the treatment of life-threatening diseases (9).

Furthermore, despite scientific and technological de-

velopments the perinatal mortality rate has remained constant from 1982 up to now (6), and increasing the rate of caesarean delivery plays a significant role (6, 10). The high number of unnecessary caesarean deliveries is symbol of the over-medicalization of childbirth. The international communities suggest that a high rate of caesarean delivery is an indicator of poor quality maternal care, because inappropriate use of caesarean delivery is associated with negative effects on the health of the mother and the infant (11).

In Iran, one million women give birth yearly, and 90% of these women receive prenatal care in the hospital, but still the maternal and neonatal mortality rates are high (12). In a study in Iran, 73% of deliveries were performed by caesarean section (13). The disability-adjusted life year (DALY) score for caesarean section deliveries compared to vaginal delivery was 2.3 times higher (14). It has also been reported that 65% of births in Iran were performed by obstetricians and 35% by midwives (15).

Available studies have indicated that there has been a vast extension of medicalization of pregnancy and birth in Iran. Most studies have focused on birth, and less attention has been paid to care during pregnancy and delivery as an influential factor. Also, separating high-risk pregnancies and deliveries that may need obstetric interventions from low-risk pregnancies and deliveries that may not have not been undertaken in previous studies (12, 13, 15).

## 2. Objectives

The present study was performed with the aim of determining the rate of application of maternal medicalized care in low-risk pregnancies and births and to identify the factors that are associated with type of delivery.

## 3. Patients and Methods

### 3.1. Study Population and Sampling

This was a cross-sectional study. The study population was 320 women in Mashhad, the center of Khorasan Razavi province, Iran. The total population of the city is about three million people, and the female population is about 1.5 million. The population of married women of reproductive age is about 1.1 million (N) (16). Also, by considering 1.96 for a z-score, 0.05 for margin of error (d), 0.5 for the estimated proportion (p), the sample size was estimated with Equation 1:

$$N = \frac{NZ^2P(1-P)}{Nd^2 + Z^2p(1-p)} \quad (1)$$

Two private and two public hospitals were selected among four public and four private hospitals in this city

with the help of stratified-cluster sampling. Inside the clusters, easy sampling was done. All of the hospitals were general-type hospitals. The public hospitals had about 850 beds and 30 sections. The private hospitals had about 110 beds and 12 sections. One of the public hospitals was a referral hospital.

This cross-sectional study was part of an exploratory mixed method study; in this mixed method study, a tool was designed for assessment of medicalized pregnancy and birth. The validity of this tool was assessed using content and face validity. The total content validity ratio (CVR), and total content validity index (CVI) of this checklist were 0.8 and 0.9, respectively. The reliability was assessed with the help of a test-retest. Qualitative variables were assessed using the Kappa agreement coefficient, and quantitative variables were assessed using a correlation coefficient ( $P < 0.0001$ ).

The checklist had nine questions to assess the demographic and socioeconomic status. Also, it had seven questions to determine the reproductive history of the participants. Furthermore, 11 questions were used to show the elements of preconception and prenatal care, and 15 questions were designed to evaluate intrapartum care.

### 3.2. Data Collection

Data was collected from May 3, 2014 to July 26, 2014. For each hospital, a list of all women who delivered by natural vaginal delivery and caesarean section was prepared. These women were referred to the study and if they provided consent and their pregnancy was in the low-risk group, they were entered into the study. This means that women who had no history of medical diseases before and during delivery, spontaneous and singleton pregnancy with no complications (such as bleeding, placenta previa, preeclampsia and other medical problems) during pregnancy and delivery were included in the study. The questionnaire was completed as an interview. Of 371 women, a total of 327 were eligible for the study, however, six cases refused to participate in the study, and one case also refused to answer the questions during the study. Therefore, a total of 320 women participated in the study.

### 3.3. Ethical Consideration

This study was approved by the ethics committee of Mashhad University of Medical Sciences, Iran (ethical approval code: 511/2944). Oral informed consent was obtained from all participants. Participants were informed that they were able to withdraw from the study at any time. All information was kept anonymous to preserve confidentiality.

### 3.4. Data Analysis

In this study, descriptive statistics were used such as frequency, mean, median and standard deviation. For further analysis of the data, mode of delivery (vaginal and caesarean) was considered as the outcome variable. To evaluate the differences in the ratio of vaginal delivery and caesarean delivery, socioeconomic and demographic variables, and also care during pregnancy and delivery, the chi-square test and Fisher's exact test were used when the second variable was qualitative. For interval variables, the normality of data was assessed by the Kolmogorov-Smirnov test. When the data had normal distribution, an independent t-test was used, and in the case of non-normal distribution the Mann-Whitney test was applied.

Using univariate analysis, the main factors were selected for entering into the regression model. All the variables with a P value < 0.2 were entered into the regression model and included: mother's age, source of receiving prenatal care, number of laboratory examinations, number of prenatal visits, number of supplements used, time of hospitalization and performing of electronic monitoring of the fetal heart on admission. A value of P < 0.05 was considered statistically significant for all tests. All statistical analyses were performed using SPSS version 11.5.

## 4. Results

A total of 320 women participated in the present study. All participants were Muslim, married and lived with their spouses. The mean age of the women was  $27.9 \pm 4.3$  years, and the mean age of their husbands was  $32.1 \pm 5.2$  years. Of the women, 52.8% were primiparous and 47.2% multiparous. Of this population, 47.5% had secondary education, 79.7% were homemakers, 92.2% had medical insurance and 44.7% had supplementary insurance.

Of the 320 women who participated in the study, 111 (34.7%) had vaginal birth, and 209 (65.31%) had caesarean section birth. Of the vaginal births, 0.9% were assigned to operative delivery and the rest (33.8%) were dedicated to natural delivery. Of those who had caesarean delivery, 12.5% had elective caesarean delivery, 29.1% had medical caesarean delivery and 23.8% had a repeated caesarean section. Of the 47.2% of multiparous women in our study, 47.46% had a history of vaginal birth and 52.2% had a history of caesarean section.

Most participants in the study had preconception and prenatal care (51.6% and 99.6%, respectively), which was mostly received from obstetricians (72.8% and 51.6%, respectively). Of the women, 67.2% underwent prenatal screening. The values for taking medication for common problems in pregnancy and taking vitamin-mineral supplements were 46.2% and 98.8%, respectively. The median

numbers (percentiles 25 and 75) of prenatal visits, laboratory examinations and sonographies taken were 12 (10, 15), 3 (2, 3) and 4 (3, 4), respectively.

Almost half of the participants (51.5%) were hospitalized before the onset of labor. Most of them received fetal heart monitoring before and after admission for labor (76.2% and 97.7%, respectively). For 97.5% of the women, an IV line was established on admission. Almost half of the women received augmentation and pharmacological pain relief (59.5% and 52.2%, respectively). Free movement during labor was less used (39.7%), while episiotomy and fundal force during birth was used in the majority of cases (80.3% and 60.7%, respectively). Obstetricians were in attendance at birth in 74.1% of vaginal deliveries.

The relationship between the mode of childbirth and socioeconomic and demographic characteristics was assessed (Table 1). These characteristics did not associate with the mode of delivery.

Evaluation of the relationship between the care received during pregnancy and the mode of childbirth (Table 2) indicated that the source of prenatal care is significantly associated with the mode of childbirth ( $P = 0.015$ ). That is, the rate of caesarean section is higher in women who receive prenatal care from obstetricians. The number of laboratory examinations performed during pregnancy was associated with the mode of delivery ( $P = 0.003$ ). Thus, the mean of laboratory examinations during pregnancy was higher in women who had caesarean sections. Also, the number of vitamin-mineral supplements used in pregnancy was significantly associated with the mode of delivery ( $P = 0.003$ ). Thus, the mean of supplements used was higher in women who delivered by caesarean section. Almost all of the participants who had vaginal birth or caesarean received prenatal care and vitamin-mineral supplements.

The relationship between care provided during hospitalization, labor and birth, and the mode of childbirth was also studied (Table 3). Time of hospitalization was significantly associated with the mode of childbirth ( $P < 0.0001$ ). The caesarean rate was higher in the group who were hospitalized before beginning labor. There was a significant association between performing electronic monitoring of the fetal heart on admission and the mode of childbirth ( $P = 0.002$ ). Hence, women who had undergone electronic monitoring on admission had a higher caesarean section rate.

Augmentation by oxytocin performed during labor was significantly associated with the mode of delivery ( $P = 0.028$ ). Hence, the highest rate of vaginal delivery was observed in the group who had not received labor augmentation with oxytocin. Furthermore, there was a significant association between pharmacological pain relief and the

**Table 1.** Relationship Between Demographic, Reproductive and Socioeconomic Characteristics and the Type of Childbirth

Characteristic	Vaginal Birth, No. (%)	Caesarean Birth, No. (%)	$\chi^2$ <sup>a</sup>	P Value
<b>Parity</b>				
Primiparous	54 (31.9)	115 (68.0)	1.462	0.227
Multiparous	58 (38.4)	93 (61.5)		
<b>Woman's education</b>				
Elementary	14 (46.6)	16 (53.3)	3.286	0.193
Secondary	56 (36.8)	96 (63.1)		
Post-secondary	42 (30.4)	96 (69.5)		
<b>Woman's occupation</b>				
Homemaker	94 (36.8)	161 (63.1)	1.915	0.166
Employed	18 (27.6)	47 (72.3)		
<b>Husband's education</b>				
Elementary	6 (25.0)	18 (75.0)	1.234	0.540
Secondary	60 (35.0)	111 (64.9)		
Post-secondary	46 (36.8)	79 (63.2)		
<b>Husband's occupation</b>				
Worker/farmer	23 (46.0)	27 (54.0)	3.995	0.262
Self-employed	54 (32.9)	110 (60.0)		
Employee/professional job	35 (33.0)	71 (66.9)		
<b>Housing status</b>				
Rental housing	58 (51.7)	54 (48.2)	2.054	0.152
Private housing	125 (60.0)	83 (40.4)		
<b>Insurance</b>				
Yes	101 (34.2)	194 (65.9)	0.966	0.326
No	11 (44.0)	14 (56.0)		
<b>Supplementary insurance</b>				
Yes	47 (33.0)	95 (71.9)	0.406	0.524
No	65 (36.5)	113 (63.4)		
Characteristic	Mean $\pm$ SD	Mean $\pm$ SD	T <sup>b</sup>	P Value
<b>Women's age</b>	27.4 $\pm$ 4.5	28.22 $\pm$ 4.1	1.500	0.135
<b>Husband's age</b>	31.9 $\pm$ 5.1	32.2 $\pm$ 5.2	1.458	0.146

<sup>a</sup>Chi-square test.

<sup>b</sup>Independent t-test.

mode of delivery (P = 0.008). This relationship revealed that the rate of vaginal birth was higher in the group receiving pharmacological pain relief. Artificial rupture of the membranes was significantly associated with mode of delivery (P= 0.037). The vaginal birth rate was higher in the group who had received this care (Table 3).

The variables that were able to determine the mode of delivery are shown in Table 4, along with the odds ratio. The number of prenatal care visits, the number of labora-

tory tests, the time of hospitalization and electronic monitoring of fetal heart on admission were associated with the mode of delivery (P < 0.05).

### 5. Discussion

This study was a cross-sectional study on postpartum women. It documented routine medicalized interventions

**Table 2.** Relationship Between Preconception and Prenatal Care Characteristics and the Type of Childbirth

Care Characteristics	Vaginal Birth, No. (%)	Caesarean Birth, No. (%)	$\chi^{2a}$	P Value
<b>Preconception care</b>				
Received	54 (32.5)	112 (67.4)	0.783	0.376
Not received	57 (37.2)	96 (62.7)		
<b>Source of preconception care</b>				
Midwife (health care centers)	19 (43.1)	25 (56.8)	3.125	0.077
Obstetricians	34 (28.5)	85 (71.4)		
<b>Source of prenatal care</b>				
Midwife (healthcare center)	12 (63.1)	7 (36.8)	8.408	0.015 <sup>b</sup>
Obstetricians	50 (30.3)	115 (69.6)		
Midwife (health care center) Obstetricians	50 (36.7)	86 (63.2)		
<b>Prenatal screening</b>				
Yes	68 (31.6)	147 (68.3)	3.275	0.070
No	44 (41.9)	61 (58.0)		
<b>Medication for common problems in pregnancy</b>				
Yes	50 (33.7)	98 (58.0)	0.179	0.672
No	62 (36.0)	110 (63.9)		
<b>Number of received care</b>				
	<b>Mean <math>\pm</math> SD</b>	<b>Mean <math>\pm</math> SD</b>	<b>Z<sup>c</sup></b>	<b>PValue</b>
<b>Prenatal visit</b>	12.5 $\pm$ 3.9	12.8 $\pm$ 4.0	0.913	3.61
<b>Laboratory test</b>	2.5 $\pm$ 1.3	3.0 $\pm$ 1.6	2.962	0.003 <sup>b</sup>
<b>Sonography</b>	3.9 $\pm$ 1.7	4.4 $\pm$ 2.1	1.461	0.144
<b>Vitamin-mineral supplements</b>	3.8 $\pm$ 1.0	4.1 $\pm$ 0.9	2.964	0.003 <sup>b</sup>

<sup>a</sup>Chi-square test.

<sup>b</sup>Statistically significant.

<sup>c</sup>Mann-whitney test.

that are usually performed in the care of low-risk pregnancies and childbirths in Mashhad, Iran. The results showed that these interventions are widely used in low-risk pregnancies and births. In addition, caesarean section accounts for a significant amount of births.

The results of our study look meditative in terms of the number of vitamin-mineral supplements and drugs used to treat the common problems of pregnancy. Para-clinical examinations such as laboratory studies, prenatal screenings and sonography are frequently performed during pregnancy. According to the national guidelines of prenatal care in Iran, the required number of laboratory studies and ultrasonography is two in a normal pregnancy (17). In another study conducted in the northern part of Iran, 56.4% of participants had performed three to four sonography studies in normal pregnancies (18).

In our study, a considerable proportion of vaginal deliveries with obstetric interventions can be seen. Therefore, interventions, such as free movement and desired po-

sition during labor, do not have a significant effect on the statistics, while establishing an IV line on admission, labor induction by oxytocin and performing episiotomy during delivery had a significant effect. Our results are consistent with the results of a study performed in Arabic countries to assess maternal care. In this study, it was found that free movement during labor, which is considered to have beneficial effects, is not widely used in labor and delivery. However, procedures were used widely that may be unnecessary and harmful or their effects have not been properly studied, such as routine use of episiotomy (19).

Despite the fact that women with low-risk pregnancy and birth were examined, a significant number of women had received preconception and prenatal care and even performed vaginal birth using obstetricians. In a pilot study in Tehran (capital of Iran) performed on a small sample of women, 65% of deliveries were done by obstetricians (15). In a study by Bashour and Abdulsalam (2006) in Syria, 60.4% of women preferred their labor and delivery to be

**Table 3.** Relationship Between Intrapartum Practice Characteristics and the Type of Delivery

Intrapartum Practice Characteristic	Vaginal Birth, No. (%)	Caesarean Birth, No. (%)	$\chi^2$ <sup>a</sup>	P Value
<b>Time of hospitalization</b>				
Beginning pain/prom	94 (60.6)	61 (39.3)	86.901	0.000 <sup>b</sup>
Before beginning labor with obstetrician decision	18 (10.9)	147 (89.0)		
<b>Electronic monitoring of fetal heart on admission</b>				
Yes	74 (30.3)	170 (69.6)	9.858	0.002 <sup>b</sup>
No	38 (50.0)	38 (50.0)		
<b>Augmentation</b>				
Yes	58 (71.6)	23 (28.3)	6.670	0.010
No	52 (89.6)	6 (10.3)		
<b>Pharmacological pain relief</b>				
Yes	63 (88.7)	8 (11.2)	7.108	0.008 <sup>b</sup>
No	48 (70.5)	20 (29.4)		
<b>Artificial rupture of membrane</b>				
Yes	58 (89.2)	7 (10.7)	4.589	0.032 <sup>b</sup>
No	53 (74.6)	18 (25.3)		
<b>Freedom of movement</b>				
Yes	42 (77.7)	12 (22.2)	0.659	0.417
No	69 (84.1)	13 (15.8)		
<b>Choice of position in labor</b>				
Yes	80 (80.0)	20 (20.0)	0.880	0.348
No	31 (86.1)	5 (13.8)		

<sup>a</sup>Chi-square test.

<sup>b</sup>Statistically significant.

**Table 4.** Factors Associated with Type of Delivery

Variable	B	SE	P	Odds Ratio (95% CI)
Age	0.017	0.033	0.608	1.01 (0.95 - 1.08)
Source of prenatal care	0.259	0.229	0.258	1.29 (0.82 - 2.03)
Number of prenatal care visits	-0.100	0.044	0.024 <sup>a</sup>	0.90 (0.83 - 0.98)
Number of laboratory tests	0.233	0.099	0.018 <sup>a</sup>	1.26 (1.04 - 1.53)
Number of vitamin-mineral supplements	0.240	0.140	0.086 <sup>a</sup>	1.27 (0.96 - 1.67)
Time of hospitalization	0.875	0.109	0.000 <sup>a</sup>	2.40 (1.93 - 2.97)
Electronic monitoring of fetal heart on admission	0.904	0.332	0.006 <sup>a</sup>	2.47 (1.28 - 4.73)

<sup>a</sup>Statistically significant.

attended by obstetricians, while only 21.2% of women preferred their labor to be attended by a midwife (20).

In explaining the above findings, it may be said that with the expansion of medicalization, the application of new technologies and interventions in pregnancy and de-

livery will improve (21), as their wide use in our results was observed. On the other hand, when obstetric procedures are used in low-risk pregnancy and delivery, the role of midwives will change (22), and following this, the perception of the skills of midwives will change. As a result,

midwives will be replaced by obstetricians and marginalized in the care of low-risk pregnancy and birth (7).

The results of our study, in terms of identifying factors associated with the type of delivery, showed that the number of laboratory examinations is one of the factors affecting caesarean delivery. In a study by Beckett (2011), the mean number of laboratory examinations during pregnancy was 4.6 (23). But, they did not report the effect of this finding on the caesarean section rate.

Time of hospitalization was strongly associated with caesarean delivery in our study, so that, hospital admissions before the onset of labor increased the risk of caesarean delivery by 2.3 times. Wagner (2001) believes that, in today's world, doctors are trying to perform caesarean delivery before the onset of natural labor and bypass this normal process, because waiting to begin delivery means there could be a lack of proper planning, making delivery more difficult (9).

The results of our study showed a 2.3 times increase in caesarean delivery when performing electronic monitoring of the fetal heart rate during admission. Electronic monitoring on admission, known as the fetal admission test, is used to assess fetal well-being (6). The increased rate of caesarean delivery when performing electronic monitoring of the fetal heart on admission, and the equal rate of caesarean delivery and vaginal delivery when not performing this test shows the role of this diagnostic technique in increasing caesarean delivery in low-risk pregnancies and deliveries. Fetal heart rate monitoring was shown to be useful in some studies (24, 25), however, other studies were not successful in showing the long-term efficacy of this intervention, because this monitoring was accompanied by a high rate of caesarean section (26, 27).

This study provided a general picture of care in low-risk pregnancies and births and one of the important outcomes of care, which is the mode of childbirth. Our study is one of a limited number of studies that have been conducted to determine the rate of application of medicalized maternal interventions in low-risk pregnancies and births, and to evaluate the relationship between these interventions and the mode of childbirth. One of the weaknesses of our study was the small sample size in order to assess the affected factors on type of childbirth.

On the other hand, in our study both primiparous and multiparous women were enrolled, although separate evaluation and comparison of the factors in the two groups was not possible in this study. Furthermore, the data was collected through the answers of women who had delivered. This is considered as one of the strengths and also one of the weaknesses of our study. It is a strength because the data was directly collected from the women who received care, and it is a weakness because there was the

possibility of recall bias.

The results of this study can be useful in the planning of programs promoting care of low-risk pregnancies and births and also for the clinical decisions of healthcare providers. Cohort studies with large sample sizes that collect data from early pregnancy, and also clinical trials, are needed in order to analyze the points and achieve more accurate results regarding minimal intervention in low-risk pregnancy and childbirth.

### 5.1. Conclusion

This study shows that low-risk pregnancies and births in our population are cared for with a medical approach and medicalized interventions are widely used. Therefore, the approach of care with midwives has been marginalized. Perhaps we can say that some of the studied interventions, in addition to imposing costs that are outside the scope of our study, are factors influencing the increasing rate of caesarean section births. According to the provided information, it seems that it is necessary to adjust health policy to provide the care that is appropriate for low-risk pregnancies and deliveries.

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### Footnotes

**Authors' Contribution:** Sedigheh Sedigh Mobarakabadi contributed to the study design, data collection, data analysis, and drafting of the manuscript. Khadijeh Mirzaie Najmabadi participated in the study design, and drafting of the manuscript. Similarly, Mahmoud Ghazi Tabatabaie helped us with the study design, and drafting of the manuscript. Habibollah Esmaily, contributed to the study design, data analysis, and drafting of the manuscript.

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