

# Investigation of the Prevalence of Induced Abortions, Spontaneous Abortions, and Cases of Forensic Medicine Referrals Based on Demographic Characteristics

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## Abstract

**Background:** Induced and unhealthy abortions exist worldwide, especially in developing countries. Awareness of the prevalence of abortion in the community can be an indirect measure of maternal health status. The aim of the present study was to determine the prevalence of induced (forensic medicine referrals and obstetric indications) and spontaneous abortions based on demographic characteristics in 2018.

**Methods:** This epidemiologic-cross-sectional study was conducted in the hospitals of Shiraz University of Medical Sciences in 2018. Out of 5848 pregnant women, 437 cases of abortion were diagnosed within 3 months, making up the sample size. Data were collected using a researcher-made demographic questionnaire and analyzed using descriptive statistics (mean, percentage, and so forth).

**Results:** The overall prevalence of abortion in this study was 7.46%. The highest prevalence was observed in induced abortion with other causes (4.17%), followed by induced abortion with a forensic medicine letter (1.5%), and spontaneous abortion (1.79%), respectively. The highest frequency of induced abortion was found in the age group 30-34 (34.3%) and in housewives (76.2%). The highest frequency of education was high school belonging to mothers with spontaneous abortion (53.3%). There was a statistically significant difference among the variables of age, mother's education, age, spouse's occupation, and type of abortion ( $P < 0.05$ ).

**Conclusions:** The prevalence of abortion was 7.46%, two thirds of which were abortion induced by other causes (55.8%). In addition to group education, health educators should plan effective methods of face-to-face and individual counseling to change mothers' attitudes and inform them of the consequences of abortion.

**Keywords:** Abortion, Stress, Religious, Attitude, Spontaneous

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## 1. Introduction

Abortion is defined as spontaneous or intentional termination of pregnancy prior to week 20 of pregnancy (1). In the United States, 15% of known pregnancies end with spontaneous abortion and about one third of pregnancies end with elective abortion (2). In this country, the Centers for Disease Control estimated the abortion rate at 12.5 per 1,000 women aged 15-44 in 2013 (3).

In 2012, the rate of induced abortion was estimated at approximately 17 per 1,000 women aged 15-44 years in Senegal (4). The estimation of abortion rate in Pakistan (2012) was 50 cases per 1000 women (5). In a retrospective study by Motavalli and colleagues in Ardabil, the prevalence of abortion was estimated at 8.3% (6). The results of Erfani and Shojaei's study on 3012 married women in Tehran showed that in

comparison with the year 2009, the general abortion rate decreased from 5.5 to 4.4 for every 1000 women. Moreover, about 9% of the pregnancies in Tehran resulted in abortion (7).

In Iran, due to the existing legal restrictions, many cases of induced abortion are performed in unsafe conditions; furthermore, most mothers who undergo unsafe abortions go to hospital only following the serious complications of abortion. Therefore, many cases of induced abortion are never reported (8).

Accordingly, this study was performed on patients referring to hospitals affiliated with the Shiraz University of Medical Sciences in 2018 with the aim of specifying the prevalence of induced (cases of forensic medicine referrals or midwifery indications) and spontaneous abortions and obtaining access to the statistical data on the prevalence of legal types of abortion, which is lower

than the actual rate of abortion in the community.

## 2. Objectives

The objective was to determine the prevalence of induced (forensic medicine referrals and obstetric indications) and spontaneous abortions based on demographic characteristics in 2018.

## 3. Methods

This epidemiologic-cross-sectional study was conducted in 2018 in the selected hospitals of the Shiraz University of Medical Sciences (Hazrat Zeinab, Shahid Faghihi, Hafez, and Shooshtari). To determine the sample size according to a previous study (9) and experts' opinions, 5176 pregnant women admitted to the selected hospitals were selected through considering 10% probability of loss for other parameters. However, because of the mothers' willingness to participate in the study, a sample of 5848 subjects were questioned and evaluated over a period of 3 months. These mothers had referred to the obstetric clinics of the selected hospitals of Shiraz. Among these people, 437 had complaints related to abortion based on the history and characteristics of abortion. Finally, 437 subjects were diagnosed with abortion. Written informed consents were then obtained from all the participants.

$$N = \frac{Z_{1-\alpha/2}^2 \times P(1-p)}{d^2}$$

$$\alpha = .05$$

$$p = .08$$

$$d = 0.1 \times p$$

To select a sample using an easy convenience sampling method, we included all pregnant women referred to the foregoing hospitals and cases of forensic medicine referrals. Written consent was then obtained from all women whose pregnancy had ended in abortion.

The study inclusion criteria included 10 to 49 years of age, being pregnant, married, and Iranian, and ability to read and write. The data collection tool included a demographic-information-questionnaire consisting of 60 researcher-made questions in two parts: 1) demographic questionnaire, 2) midwifery information questions.

To determine the scientific validity of the questionnaire, the content validity method was used; it was then approved by a number of faculty members of Shiraz University of Medical Sciences. Data were collected individually in the aforementioned hospitals.

## Statistical Methods

To achieve the research objectives, data were analyzed using descriptive statistics (mean, percentage, and so forth) by SPSS software version 22. Chi-square test was used to examine the differences in the demographic characteristics of abortion types.

## 4. Results

In this study, the prevalence of abortion was investigated among 5848 births during 4 months (from September 23, 2017 to January 20, 2018). The total number of abortions was 437. The overall prevalence of abortion was 7.46%. The highest frequency of abortions pertained to induced abortion with other causes (55.8%) (Table 1). Moreover, the highest prevalence belonged to induced abortion among women aged 30-34 years (34.3%) and spontaneous abortions among women aged 24-20 years (33.2%) (Table 2).

The highest frequency of education was high school in the mothers (53.3%) and fathers (45.5%) of spontaneous abortion group (Table 3). The highest frequency of abortion was observed in the induced abortion group with housewife mothers (76.2%) and in the spontaneous abortion group with self-employed fathers (72.4%) (Table 4).

Chi-square test was utilized to investigate the demographic differences in various types of induced abortion with a forensic medicine letter, induced

**Table 1:** Prevalence of abortion in the selected hospitals of Shiraz

	N (%)	Prevalence in total deliveries
Induced abortions (Forensic Medicine)	88 (20.1)	%1.5
Induced abortions (Other etiology)	244 (55.8)	%4.17
Spontaneous abortions	105 (24)	%1.79
Total	437 (100)	%7.46

**Table 2:** Frequency of induced and spontaneous abortion based on parent's age

Age	Induced abortion		Spontaneous abortion		Total	
	Mother	Father	Mother	Father	Mother	Father
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Less than 20	12 (3.6)	0 (0)	5 (4.8)	0 (0)	17 (3.9)	0 (0)
20-24	28 (8.4)	4 (1.2)	23 (21.9)	4 (3.8)	51 (11.67)	8 (1.83)
25-29	81 (24.4)	67 (20.2)	25 (23.8)	35 (33.3)	106 (24.25)	102 (23.34)
30-34	114 (34.3)	107 (32.2)	35 (33.3)	31 (29.5)	149 (34.01)	138 (31.6)
35-39	74 (22.3)	95 (28.6)	9 (8.6)	21 (20)	83 (19)	116 (26.54)
40-45	23 (6.9)	37 (11.1)	7 (6.7)	5 (4.8)	30 (6.86)	42 (9.61)
45>	0 (0)	17 (5.1)	1 (1)	9 (8.6)	1 (0.22)	26 (5.95)
Missing	0 (0)	5 (1.5)	0 (0)	0 (0)	0 (0)	5 (1.14)
Total	332 (100)	332 (100)	105 (100)	105 (100)	437 (100)	437 (100)
Mean	31.14	34.21	28.95	32.45	30.62	33.77
Standard deviation	5.72	5.91	6.19	6.56	5.92	6.11
Pearson Chi-Square*Mother: Value:29.537 df:12 P=0.003			Father:* Pearson Chi-Square Value: 20.488 df:10 P=0.025			

**Table 3:** Frequency of spontaneous and spontaneous abortion based on education

Education	Induced abortion		Spontaneous abortion		Total	
	Mother	Father	Mother	Father	Mother	Father
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Elementary	21 (%6.3)	5 (1.5)	4 (3.8)	4 (3.8)	25 (5.72)	9 (2.07)
Middle school	76 (%22.9)	32 (9.6)	23 (21.9)	16 (15.2)	99 (22.7)	48 (11)
High school (Diploma)	126 (%38)	136 (41)	56 (53.3)	48 (45.7)	182 (41.6)	184 (42.1)
Licensee	81 (%24.4)	119 (35.8)	14 (13.3)	34 (32.4)	95 (21.7)	153 (35.01)
Postgraduate	26 (%7.8)	36 (10.8)	7 (6.7)	2 (1.9)	33 (7.55)	38 (8.7)
Not mentioned	2 (%0.6)	4 (1.2)	1 (1)	1 (1)	3 (0.7)	5 (1.1)
Total	332 (%100)	332 (100)	105 (100)	105 (100)	437 (100)	437 (100)
Pearson Chi-Square*Mother: Value:28.668 df:8 P≤0.0001			Father:* Pearson Chi-Square Value: 18.005 df:8 P=0.021			

**Table 4:** Distribution of spontaneous abortion and spontaneous abortion by parental occupation

Job	Mother			Job	Father		
	Induced abortion	Spontaneous abortion	Total		Induced abortion	Spontaneous abortion	Total
	N (%)	N (%)	N (%)		N (%)	N (%)	N (%)
Housewife	253 (76.2)	77 (73.3)	330 (75.51)	Unemployed	2 (0.6)	8 (7.6)	10 (2.3)
Self-employment	20 (6)	14 (13.3)	34 (7.80)	Self-employment	216 (65.1)	76 (72.4)	292 (66.81)
Employment	58 (17.5)	14 (13.3)	72 (16.48)	Employment	110 (33.1)	21 (20)	131 (29.8)
Missing	1 (0.3)	0 (0)	1 (0.22)	Missing	4 (1.2)	0 (0)	4 (0.91)
Total	332	105 (100)	437 (100)	Total	332 (100)	105 (100)	437 (100)
Pearson Chi-Square* Value:6.994 df:4 P=0.136				Father:* Pearson Chi-Square Value: 24.544 df:4 P≤0.0001			

abortion with other causes, and spontaneous abortion. The frequency of maternal occupation and abortion type were not significantly different ( $P=0.136$ ). There was a significant difference between the type of abortion and the variables concerning father's occupation ( $P=0.0001$ ), mother ( $P=0.001$ ) and father's education ( $P=0.021$ ), and the age of the mother ( $P=0.003$ ) and father ( $P=0.025$ ), (Tables 2-4).

## 5. Discussion

Results showed that the overall prevalence of abortion in this study was 7.46%. The highest prevalence pertained to induced abortion with other causes (4.17%), followed by induced abortion with a forensic medicine letter (1.5%), and spontaneous abortion (1.79%).

According to a study, the overall rate of abortion in the United States was 12.1 per 1000 women aged 15-44 years, with 2% and 7% reduction in abortion rates compared to 2013 (3). In 2012, the overall abortion rate was reported 50 cases per 1000 women aged 15-49 years in Pakistan (5). Moreover, in Ethiopia, the ratio of induced abortion increased from 27% to 53% during 2008-2014 (10). In India (2015), the prevalence of induced abortion was 3.8% (11).

In studies conducted in other countries, induced abortion was more prevalent than the present study with inconsistent findings. The reason for the increase in global statistics could be the legality of abortion in some countries, unwanted pregnancies, single motherhood in the aforementioned countries, low socioeconomic status in developing countries and, consequently, a larger increase in abortion (12).

Therefore, differences among different countries in terms of abortion can be associated with the differences in demographic, social, economic, and cultural characteristics. In addition, the source of such heterogeneity in abortion reports can be attributed to different laws, beliefs, religions, norms, or ethics in different places (13).

In India (2015), the prevalence of spontaneous abortion was 7.2% (11). Fan and colleagues' study during 2006-2012 was conducted on the current status and risk factors of spontaneous abortion in rural women. The rate of spontaneous abortion among these women was 7.9% (14). Spontaneous abortion rate was estimated at 3% in a study carried out in Beijing on the risk factors for spontaneous abortion in pregnant women during 2000-2013 (15).

The comparison of studies conducted in other countries with the present research showed that the prevalence of abortion was higher in the former and inconsistent with the current study. The prevalence of spontaneous abortion is different over various regions due to such factors as age of marriage, pregnancy intervals, stress and tension, specific maternal diseases in specific regions, and environmental factors, to name a few. These are some of the reasons behind why our study differs from those mentioned above. In our research, the overall prevalence of abortion was 7.46%, which is lower than that of the global estimates (58.1%).

In Erfani and Shojaei's study, approximately 9% of pregnancies in Tehran resulted in abortion (7). Furthermore, Motavalli and co-workers estimated the prevalence of abortion at 8.3% (6).

In the investigations performed in Iran, the abortion rate was almost similar to and consistent with our study. Given the legal limitations for induced abortion, it is evident that the only registered cases of induced abortion have been mothers that had to go to medical centers due to severe complications of abortion and the need for hospitalization. Accordingly, it is reasonable to assume that the actual abortion statistics are higher than the obtained figures.

Based on a randomized model in a meta-analysis study, the abortion rate in Iran was estimated to be 28.84 per 1000 pregnant women, which is higher than the current research (16). This could be attributed to a number of reasons: 1) our study was done only in public and university hospitals where abortion criteria were strictly enforced and did not include private hospitals; 2) these statistics do not include illegal abortions, which might be performed by an individual or non-specialist. Therefore, the abortion rate in our study is possibly lower due to the fewer reported cases of illegal abortions.

The rate of induced abortion can also be affected by changing women's perceptions of family size, economic pressures, late marriage, access to population and family planning services, including adequate population education, lack of appropriate social policies to promote a maternal and child-friendly society, and women's efforts to achieve social and economic equality (17, 18).

Some studies consider pregnancy preference as another factor that has influenced the prevalence of induced abortion in Iran. Half of the abortions pertained to women who preferred to have two children

and more than one-third of abortions occurred in women who wanted only one child (7).

According to the results of the Iranian Demographic and Health Survey, Iranian women on average experienced 1.071 abortions during their pregnancy (19). In a study performed in eight hospitals in Isfahan (2006), 35% of the pregnancies were unwanted with 27.1% ending in induced abortion. In this study, the prevalence of induced abortion was 12% (20). Despite the quantitative and qualitative increase in contraceptive methods and the improvement in public awareness, unwanted pregnancy is still a major issue (21). When mothers encounter unwanted pregnancies, they are forced to have an abortion (22).

In our study, the highest frequency of abortion in mothers belonged to the age group 30-34. On the other hand, in a study in the United States (2013), the highest prevalence of abortion was observed in women aged 20-24 (32.7%) and 25-29 years (25.9%) (3). Additionally, in research carried out in Beijing on the risk factors in women with spontaneous abortion, their mean age was 28.84 at the time of abortion (15). Santos and co-workers studied abortion-related factors in Brazil on 350 women with induced and spontaneous abortion; it was shown that 51.7% of women were aged 20-34 years, and 39.4% were over 34 years. The mean age of women at the time of abortion was 34.5 years (23).

In our research, the age related to the highest frequency of abortion was above other studies. One of the reasons is that in other countries the age of first sexual relationship is lower than that of Iran; also, in most of these sexual relationships, there are no effective contraception methods, resulting in unwanted pregnancies. These women try to have an abortion after finding out that they are pregnant (24).

Hosseini and colleagues' study on abortion-related factors in Hamadan reported abortions in 3.8% of 3000 married women during their lifetime. Their mean age was 34.3 years, and around 1.6% of women were under 20 years old (25). Furthermore, in Tehran, the highest frequency of abortion belonged to the age group 30-34 (26). In Motavalli and co-workers' study, 60.3% of mothers were under 30 and 41.2% of the fathers were aged 30-40 years (6). In a study done in the forensic medicine centers of Shiraz during 2007-2013, the highest frequency of forensic abortions with a forensic medicine license was reported in women aged 25-30 years (31.5%) (27).

Studies have shown that the odds of abortion increase up to 0.08 per one-year increase in maternal age. Older mothers are also more bound to have abortions (28). The results of these studies are consistent with the current research. The reason for such pattern is that women usually give birth to their planned children at a young age. About 75% of pregnancies based on previous planning occur between the ages of 15 and 24.

The highest frequency of abortion (induced and spontaneous) in mothers (41.9%) belonged to high school education level (Table 3). In a study conducted in China during 2004-2008, women with a lower education had a lower prevalence of spontaneous abortion compared to those with a higher education (29). In a study conducted in Beijing, 71.1% of women who had an abortion had a bachelor's degree. Also, in Santos and colleagues' study in Brazil, 53.5% of women were either in high school or had completed their education (23).

In Motavalli and colleagues' study, 5.7% of mothers had elementary education and 37% had a high school diploma (6). Furthermore, in the research conducted by Hosseini and colleagues, 23.4% of the women and 26% of their spouses had university education (25). In Zamanian and colleagues' study conducted in Kerman, 70.5% of mothers with elective abortion, 69% with medical abortion, and 67% with spontaneous abortion had bachelor's and master's degrees. Also, regarding their spouses, 57% of cases of elective abortion, 67% of medical abortion, and 59% of spontaneous abortion had bachelor and master degrees (30). Another study in Iran showed that the education level of a couple had a direct linear relationship with the incidence of abortion. Two or three couples per 1000 cases with education levels lower than high school diploma had abortions, while in those with higher education levels, there were four or five abortions per 1000 cases (7).

People with higher education have the required knowledge about (emergency) contraceptive methods and the way to correctly use them. However, educated women try to avoid unwanted pregnancy, in which case, abortion is more likely to increase. The results of the Iranian Demographic and Health Studies (IDTS) showed that mothers with higher education levels were more likely to have an abortion (19). Also, Okereke listed the most important reasons for elective abortion as follows: job, mother's education level, having enough children, and spouse or partner pressure to have an abortion (31).

In terms of occupation, in the present study, the highest frequency of abortion was observed among housewives (75.5%) while the lowest rate was found in employed mothers (7.8%) (Table 4). In this regard, a study conducted in Beijing revealed that 42.1% of mothers with abortion were employees, 0.9% were workers, 4.5% were service workers, 6.4% were self-employed, and 15.4% were educational staff (15). In the study performed by Zamanian and colleagues, 41% of mothers had elective abortion, 74% had medical abortion, and 82% had spontaneous abortion. Husbands of 43% of women with elective abortion, 40% of women with medical abortion, and 23% of women with spontaneous abortions were employed (30). In Hosseini and co-workers' study, 88% of women with abortion were housewives (25). Ranji investigated the prevalence, causes, and complications of abortion in Azerbaijan, where 89.8% of those who had an abortion were not employed (32). In Motavalli and co-workers' study, 87.8% of women with abortion were housewives (6).

In these mentioned studies, as in our study, the highest prevalence of abortion was observed among housewives. Abortion rates in relation to husband's occupation were not included in the studies listed above, except for Zamanian and colleagues' study. However, in the current research, abortion type was described separately in relation to husband's occupation with the highest frequency of abortion pertaining to employed fathers (66.8%).

Numerous studies in Iran and other countries have shown that employed women are less likely to marry; if they marry, the number of pregnancies and children they plan to have is lower; also, they marry at a higher age, which can be attributed to the lower prevalence of abortion in these women in the present study. Moreover, the total number of these women in our study was less than the housewives (33).

In some other studies (6, 25, 30, 32), the prevalence of abortion was higher among housewives, which can be ascribed to the lower age of marriage in these women. A study by Hajizadeh and colleagues showed that the mean age of marriage in housewives was  $21.14 \pm 4.40$  and  $24.21 \pm 4.39$  in employed women, respectively. Moreover, 58 and 77.2% of housewives and employed women used contraceptive methods, respectively (34).

Housewives are less educated than employed women, and the higher the education, the lower the number of pregnancies and children will be (35). As a result, their knowledge and attitude towards family

planning is lower and; therefore, they use less reliable family planning methods.

## 6. Conclusions

The overall incidence of legal abortions (induced abortions, spontaneous abortions, and cases of forensic medicine) was not high; however, the most common type of miscarriage was induced abortion with other causes. There was a significant difference among the following variables: mother and father's age, spouse's job, mother's education, and mother's type of abortion. Due to the importance of fertility in Iran, it is necessary to psychologically support women with any type of abortion to improve their quality of life.

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