

## Systematic Review

# Induced Abortion Rate in Iran: A Meta-analysis

Zahra Motaghi MSc<sup>1</sup>, Jalal Poorolajal MD PhD<sup>2</sup>, Afsaneh Keramat PhD<sup>3</sup>, Mohammad Shariati MD<sup>4</sup>, Masud Yunesian MD PhD<sup>5</sup>, Seyyede Zahra Masoumi MSc<sup>6</sup>

## Abstract

**Introduction:** About 44 million induced abortions take place worldwide annually, of which 50% are unsafe. The results of studies investigated the induced abortion rate in Iran are inconsistent. The aim of this meta-analysis was to estimate the incidence rate of induced abortion in Iran.

**Methods:** National and international electronic databases, as well as conference databases until July 2012 were searched. Reference lists of articles were screened and the studies' authors were contacted for additional unpublished studies. Cross-sectional studies addressing induced abortion in Iran were included in this meta-analysis. The primary outcome of interest was the induced abortion rate (the number of abortions per 1000 women aged 15–44 years in a year) or the ratio (the number of abortions per 100 live births in a year). The secondary outcome of interest was the prevalence of unintended pregnancies (the number of mistimed, unplanned, or unwanted pregnancies per total pregnancies). Data were analyzed using random effect models.

**Results:** Of 603 retrieved studies, using search strategy, 10 studies involving 102,394 participants were eventually included in the meta-analysis. The induced abortion rate and ratio were estimated as 8.9 per 1000 women aged 15–44 years (95% CI: 5.46, 12.33) and 5.34 per 100 live births (95% CI: 3.61, 7.07), respectively. The prevalence of unintended pregnancy was estimated as 27.94 per 100 pregnant women (95% CI: 23.46, 32.42).

**Conclusion:** The results of this meta-analysis helped a better understanding of the incidence of induced abortion in Iran compared to the other developing countries in Asia. However, additional sources of data on abortion other than medical records and survey studies are needed to estimate the true rate of unsafe abortion in Iran.

**Keywords:** Induced abortion, Iran, meta-analysis, unintended pregnancy, unsafe abortion

**Cite the article as:** Motaghi Z, Poorolajal J, Keramat A, Shariati M, Yunesian M, Masoumi SZ. Induced Abortion Rate in Iran: A Meta-analysis. *Arch Iran Med.* 2013; **16**(10): 594 – 598.

## Introduction

Induced abortion is the intentional termination of a pregnancy by medical or surgical means before the fetus can be viable.<sup>1</sup>

Unsafe abortion is defined as an abortion conducted by a provider lacking adequate skill, or through hazardous techniques, or outside the health facilities or legally recognized places.<sup>2</sup> World Health Organization (WHO) has estimated that about 44 million induced abortions take place annually worldwide, about 50% of which are unsafe.<sup>3,4</sup>

Globally, 358,000 maternal deaths occur each year,<sup>5</sup> 47,000 of which are due to complications of induced abortion mostly in the developing countries.<sup>3</sup> In Asia, the estimated number of induced abortions was 25.9 million in 2003 and 27.3 million in 2008.<sup>4</sup> Un-

safe abortion is associated with a number of serious morbidities including uterine perforation, genital tract injuries, vesicovaginal fistula, gastrointestinal injuries, acute renal failure, septicemia, and infertility<sup>6</sup> so that a considerable amount of health budget is allocated annually to treatment of abortion-related complications.<sup>7</sup>

Several studies have been conducted in Iran, which is an Asian country, in order to estimate the incidence rate of induced abortion; however, the results are inconsistent. The incidence rate of induced abortion has been estimated as 1% to 20%.<sup>8–13</sup> Despite the efforts made, the actual induced abortion rate is unclear in Iran. Thus, the aim of this meta-analysis was to estimate the incidence rate of induced abortion among general population of Iran.

## Materials and Methods

Criteria for including studies

Cross-sectional studies, addressing the induced abortion rate in Iran, were included irrespective of publication status or language. The primary outcome of interest was the induced abortion rate or ratio. The secondary outcome of interest was the unintended pregnancy. Induced abortion was characterized as intentional termination of pregnancy before 20<sup>th</sup> gestational week and fetus weight less than 500 g.<sup>1</sup> The 'unsafe abortion rate' was defined as the number of unsafe abortions per 1000 women aged 15–44 years in a year. The 'unsafe abortion ratio' was defined as the number of unsafe abortions per 100 live births in a year.<sup>3,14</sup> The unintended pregnancy was defined as a pregnancy that was mistimed, unplanned, or unwanted at the time of conception.<sup>15</sup>

**Authors' affiliations:** <sup>1</sup>Department of Reproductive Health, School of Nursing and Midwifery, Shahrood University of Medical Sciences, Shahrood, Iran. <sup>2</sup>Research Center for Modeling of Noncommunicable Diseases, Department of Epidemiology and Biostatistics, School of Public Health, Hamadan University of Medical Sciences, Hamadan, Iran. <sup>3</sup>Department of Reproductive Health, School of Nursing and Midwifery, Shahrood University of Medical Sciences, Shahrood, Iran. <sup>4</sup>Department of Community Medicine, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran. <sup>5</sup>Center for Air Pollution Research, Institute for Environmental Research, Department of Environmental Health Engineering, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran. <sup>6</sup>Mother and Child Care Research Center, Department of Midwifery, School of Nursing and Midwifery, Hamadan University of Medical Sciences, Hamadan, Iran.

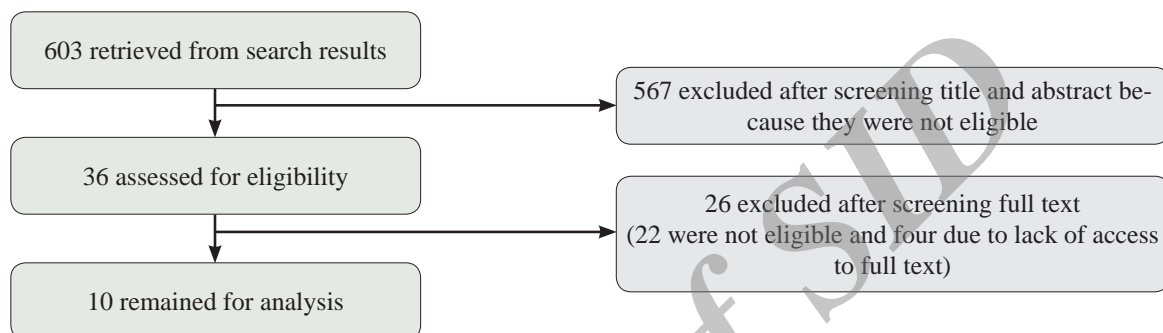
**Corresponding author and reprints:** Jalal Poorolajal MD PhD, Research Center for Modeling Noncommunicable Diseases, Department of Epidemiology and Biostatistics, School of Public Health, Hamadan University of Medical Sciences, Shahid Fahmideh Ave., Hamadan 6517838695, Iran. Tel: +98-811-838-0090, Fax: +98-811-838-0509, E-mail: poorolajal@umsha.ac.ir; poorolajal@yahoo.com.

Accepted for publication: 4 September 2013

**Table 1.** Summary of the results of the included studies regarding the incidence rate of induced abortion (IA) (per 1000 women aged 15–44 in a year) and the ratio (per 100 live births in a year), as well as the prevalence of unintended pregnancy (PUP).

Study	Date	Location	Population	Sample size	IA	IA Rate	IA Ratio	Unintended pregnancy	PUP (%)
Erfani <sup>19</sup>	2008	National	15–45 yr	87248	654	7	NR	NR	NR
Erfani <sup>9</sup>	2011	Tehran	15–45 yr	2934	16	5	NR	NR	NR
Nojomi <sup>13</sup>	2006	Tehran	15–45 yr	2470	41	16	NR	NR	NR
Rakshani <sup>12</sup>	2004	Zahedan	15–45 yr	560	5	8	NR	145	25.9
Amani <sup>8</sup>	2010	Ardabil	live births	328	6	NR	2	NR	NR
Faghihzadeh <sup>21</sup>	2003	Tehran	live births	6394	297	NR	5	2113	33.0
Kahnouei Aghdam <sup>17</sup>	2005	Ardabil	live births	600	27	NR	5	185	30.8
Mahouri <sup>10</sup>	2010	Bandar Abbas	live births	530	64	NR	12	141	26.6
Noroozi <sup>18</sup>	2005	Bushehr	live births	1000	58	NR	6	240	24.0
Vakili <sup>20</sup>	2009	Yazd	live births	330	16	NR	5	81	24.5

NR = not reported.

**Figure 1.** Flow diagram of the included studies.

#### Search methods

We developed a search strategy including the following keywords: “Iran” and “abortion or pregnancy” and “induced or criminal or illegal or intended or unsafe abortion”. The international and national electronic databases were searched until July 2012 including Medline, ISI Web of Knowledge, Scopus, MagIran, IranMedex, and Scientific Information Database (SID). The Comprehensive Seminar on Abortion in Iran was searched for unpublished studies. We also scanned the reference lists of all included studies for additional references. We contacted the authors of the included studies for additional unpublished studies.

#### Data collection and analysis

Two authors screened the titles and abstracts of the retrieved studies to decide on which studies met the inclusion criteria of this meta-analysis. Any disagreement was resolved by the third author. Then, the full texts of the eligible studies were reviewed and the necessary data were extracted and entered into an electronic data-sheet. The data extracted for analysis included: first author’s name, data and location of study, age of participants, sample size, number of induced abortions, and number of unintended pregnancies.

Methodologic quality of the included studies was investigated using Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist<sup>16</sup> including: a) definition of the outcome (induced abortion); b) methods of selection of participants; c) data collection method; d) sampling strategy; e) precision; f) locations; and g) relevant dates. The studies were considered as high-quality studies if they reported all items, moderate-quality studies if they reported all items but one, and low-quality studies if otherwise. Accordingly, four studies had high quality,<sup>10,13,17,18</sup> four studies had moderate quality,<sup>8,12,19,20</sup> and

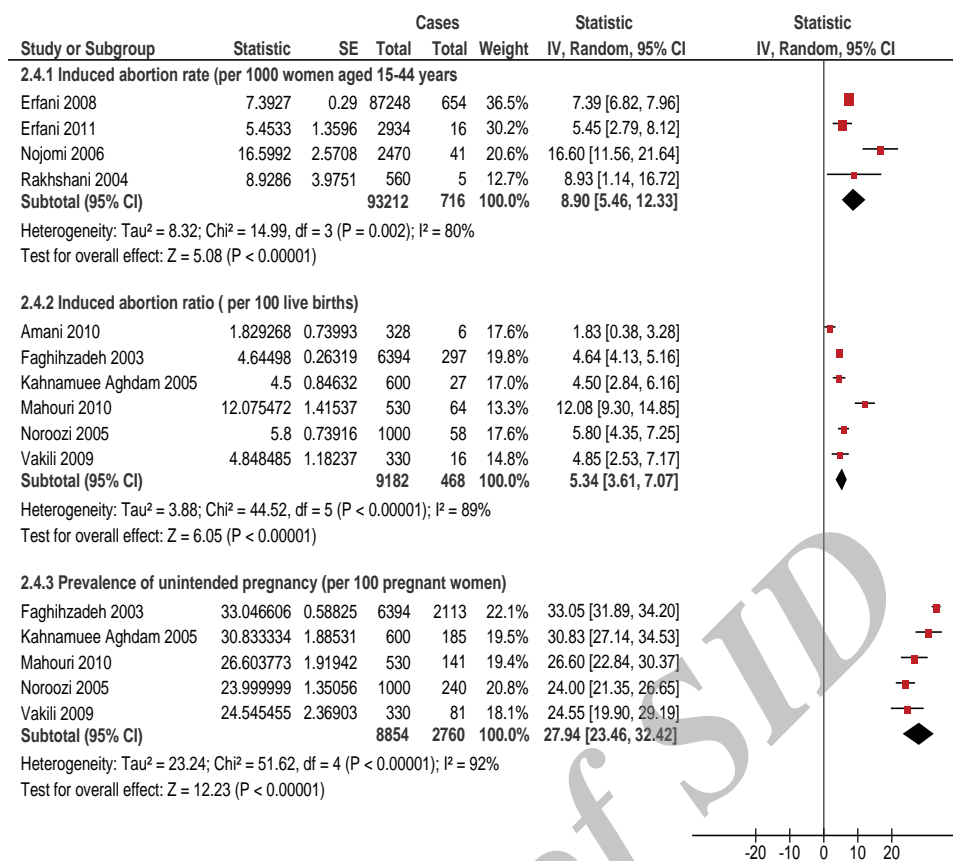
two studies had low quality.<sup>9,21</sup> The overall incidence of induced abortion was 0.058 (95% CI: 0.023, 0.094) based on high-quality studies, 0.015 (95% CI: 0.005, 0.025) based on moderate-quality studies, and 0.026 (95% CI: 0.014, 0.066) based on low-quality studies.

Statistical heterogeneity was explored using the Chi-square test at 5% significance level ( $P < 0.05$ ). Inconsistency across studies’ results was quantified using  $I^2$  statistics.<sup>22</sup> The between-study variance was estimated using tau<sup>2</sup> statistics.<sup>22</sup> In addition, Egger and Begg tests at the 5% significance level were employed for assessing publication bias. Both Review Manager 5 and Stata 11 statistical softwares were used for data analysis. A meta-analysis was performed to obtain summary measure of the induced abortion rate, as well as the prevalence of unintended pregnancy. Data were analyzed and the results were reported using random effect models with 95% CI.

## Results

Of 603 retrieved studies, using search strategy, 36 studies were considered potentially eligible. After screening full texts, 10 studies were eventually included for meta-analysis including four studies published in English<sup>9,13,19,21</sup> and six studies in Persian (Figure 1).<sup>8,10,12,17,18,20</sup>

This meta-analysis included 10 studies with two subgroups and 102,394 participants. The first subgroup included four studies involving 93,212 subjects addressing the induced abortion rate.<sup>9,12,13,19</sup> The second subgroup included six studies involving 9,182 subjects addressing the induced abortion ratio.<sup>8,10,17,18,20,21</sup> In addition, six studies involving 9,414 subjects reported the prevalence of unintended pregnancy.<sup>10,12,17,18,20,21</sup> The characteristics of



**Figure 2.** Forrest plot of the induced abortion rate and ratio, as well as the prevalence of unintended abortion (SE: standard error; IV: inverse variance).

the included studies are shown in Table 1.

According to the results of this meta-analysis, the induced abortion rate was estimated as 8.9 per 1000 women aged 15–44 years (95% CI: 5.46, 12.33) and the induced abortion ratio was estimated as 5.34 per 100 live births (95% CI: 3.61, 7.07). In addition, the prevalence of unintended pregnancy was estimated as 27.94 per 100 pregnant women (95% CI: 23.46, 32.42) (Figure 2).

There was a considerable heterogeneity among the included studies so that the results of Chi-square test for heterogeneity was strongly significant for the induced abortion rate ( $P = 0.002$ ), for the induced abortion ratio ( $P < 0.001$ ), and for the prevalence of unintended pregnancy ( $P < 0.001$ ) as shown in Figure 2. In addition, the  $I^2$  (80%, 89%, and 92%, respectively) and tau<sup>2</sup> statistics confirmed this issue. Publication bias was assessed using Begg and Egger tests. The results of Begg and Egger tests were not statistically significant for estimating the induced abortion rate ( $P = 0.497$  and  $P = 0.583$ , respectively) as shown in Figure 3, and the ratio ( $P = 0.348$  and  $P = 0.566$ , respectively) as shown in Figure 4. The results of these were not statistically significant for unintended pregnancy either ( $P = 0.851$  and  $P = 0.048$ , respectively) as shown in Figure 5.

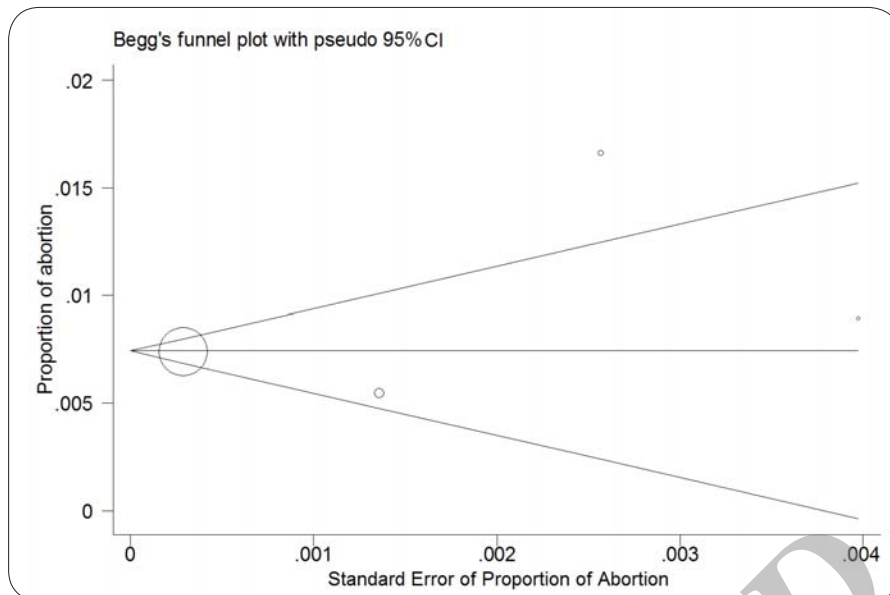
## Discussion

In 2008, 43.8 million abortions took place worldwide, six million in the developed countries, and 37.8 million in the developing countries.<sup>14</sup> According to the WHO report in 2008<sup>3</sup>, the global unsafe abortion rate was estimated as 22 per 1000 women aged 15–44 years with a great diversity between the regions. The un-

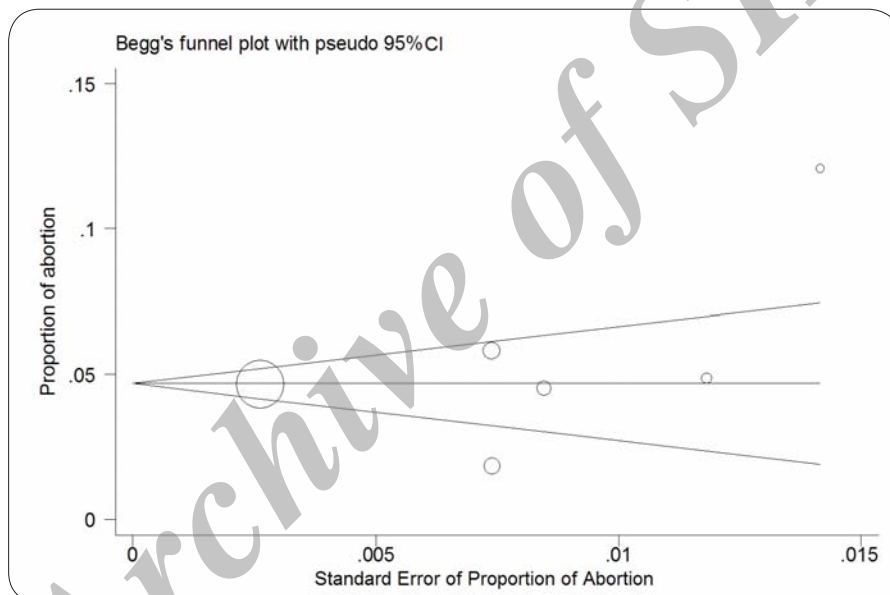
safe abortion rate was estimated as six per 1000 women in the developed countries and 23 per 1000 women in the developing countries. According to this report, the global unsafe abortion ratio was 13% in the developed countries and 21% in the developing countries. In addition, the estimated abortion rate was 28 per 1000 women aged 15–44 years in eastern Asia, 26 per 1000 in south-central Asia, 36 per 1000 in south-eastern Asia, and 26 per 1000 in western Asia in 2008.<sup>4</sup> This meta-analysis showed an inconsistency between the results of studies addressing the incidence of induced abortion in Iran. The estimated induced abortion rate was about 8.90 per 1000 women aged 15–44 years and the induced abortion ratio was 5.34 per 100 live births, with a strong heterogeneity across the studies' results.

Despite this diversity, the results of this meta-analysis indicated that the induced abortion rate in Iran is much less than the average abortion rate worldwide and in the developing countries. However, the conditions under which abortion is legally permitted are highly restricted in Iran.<sup>23,24</sup> This may suggest that the true abortion rate in Iran is underestimated. Because, where induced abortion is legally restricted and largely inaccessible, little information is available on unsafe abortion practice. In such circumstances, it is difficult to estimate the abortion rate, thus occurrence tends to be underestimated, and unreported or under reported in medical records. No information is available on women who had unsafe abortion complications. Therefore, only the "tip of the iceberg" is visible in the number of mortality and morbidity due to unsafe abortion.<sup>3</sup>

There was an evidence of heterogeneity between the results of the included studies. One reason for this heterogeneity may be attributed to the methodologic quality of the studies. Only four out



**Figure 3.** The regression asymmetry plot assessing publication bias among the studies addressing the induced abortion rate.



**Figure 4.** The regression asymmetry plot assessing publication bias among the studies addressing the induced abortion ratio.

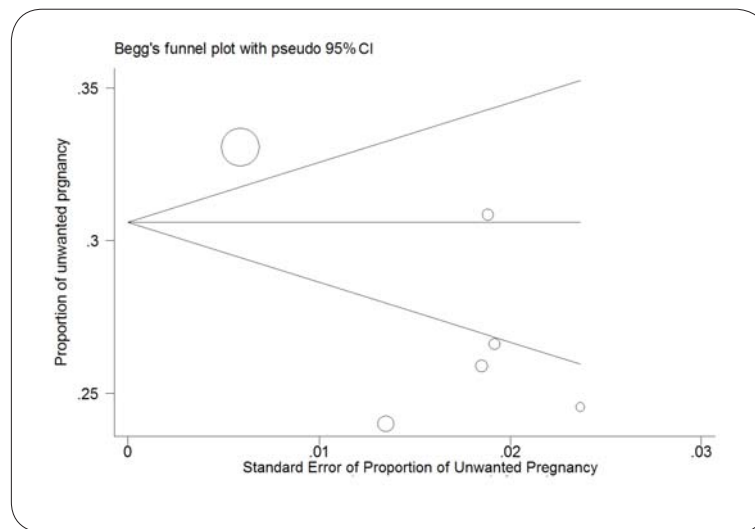
of 10 studies had a high quality and the others had moderate to low quality. This may explain the inconsistency between the results of the included studies. Furthermore, the sample size of the studies varied from a minimum of 328 to a maximum of 87248 subjects. Small sample size makes the results prone to random error.

Another reason for the observed heterogeneity may be attributed to studies with large sample sizes. Chi-square and  $I^2$  tests of heterogeneity are highly dependent on the magnitude and direction of the effects and the strength of evidence for heterogeneity. In other words, chi-square test has a low power in situations when studies have a small sample size or are few in number and vice versa,<sup>22</sup> as was the case in our review.

We developed a wide search strategy to include as many studies as possible. We screened 603 retrieved articles and eventually included 10 eligible studies in the meta-analysis involving 102,394 subjects. Egger and Begg tests rejected the possibility of

publication bias. Therefore, the number of studies and the number of participants allows a relatively robust conclusion regarding the objective of the study for estimating the induced abortion rate in Iran.

There were a few limitations and potential biases in this meta-analysis. First, four studies seemed potentially eligible to be included in our meta-analysis, but the full texts were not accessible. We contacted the authors to send us the full texts, but we received no reply. This issue may raise the possibility of selection bias. Second, the quality of six out of 10 studies was moderate or low. This issue may raise the possibility of information bias. Third, all studies included in this meta-analysis investigated induced abortion among married women. Thus, the results of this meta-analysis can not be generalized to the abortions which may occur due to extramarital unintended pregnancies.



**Figure 3.** The regression asymmetry plot assessing publication bias among the studies addressing the prevalence of unintended pregnancy.

## Conclusion

The results of this meta-analysis helped a better understanding of the incidence of induced abortion in Iran compared to the other developing countries in Asia. However, additional sources of data on abortion other than medical records and survey studies are needed to estimate the true rate of unsafe abortion in Iran.

**Funding:** No sources of support provided.

**Conflict of interest:** The authors have no conflicts of interest to declare for this study.

## Acknowledgment

We wish to thank the Vice-chancellor of Research and Technology, Shahrood University of Medical Sciences, for approving this study.

## References

- Cunningham FG, Leveno KL, Bloom SL, Hauth JC, Rouse D, Spong CY. *Williams Obstetrics*. 23rd ed. New York: McGraw-Hill; 2010.
- World Health Organization. *The Prevention and Management of Unsafe Abortion*. WHO/MSM/92.5. Geneva: WHO; 1992.
- World Health Organization. *Unsafe Abortion: Global and Regional Estimates of the Incidence of Unsafe Abortion and Associated Mortality in 2008*. Geneva: WHO; 2008.
- Sedgh G, Singh S, Shah IH, Ahman E, Henshaw SK, Bankole A. Induced abortion: incidence and trends worldwide from 1995 to 2008. *The Lancet*. 2012; **379**: 625 – 632.
- World Health Organization. *Trends in Maternal Mortality: 1990 to 2008, Estimates Developed by WHO, UNICEF, UNFPA, and The World Bank*. Geneva: WHO; 2010.
- Shaikh Z, Abbassi RM, Rizwan N, Abbasi S. Morbidity and mortality due to unsafe abortion in Pakistan. *Int J Gynaecol Obstet*. 2010; **110**: 47 – 49.
- Levin C, Grossman D, Berdichevsky K, Diaz C, Aracena B, Garcia SG, et al. Exploring the costs and economic consequences of unsafe abortion in Mexico City before legalisation. *Reprod Health Matters*. 2009; **17**: 120 – 132.
- Amani F, Bashiri J, Nahan Moghadam N, Tabraii Y. The logistic regression model in examining factors affecting unintended pregnancy[in Persian]. *J Qom Univ Med Sci*. 2010; **4**: 32 – 36.
- Erfani A. Induced abortion in Tehran, Iran: estimated rates and correlates. *Int Perspect Sex Reprod Health*. 2011; **37**: 134 – 142.
- Mahouri K, Amirian M. Unwanted pregnancy and related factors in women referred to health centers in Bandar Abbas in 2005 [in Persian]. *Hormozgan Med J*. 2010; **1**: 25 – 32.
- Kasmaei P, Atrkar Roshan Z. Prevalence and correlated factors with unintended pregnancies [in Persian]. *J Med Sci Gilan*. 2004; **12**: 61 – 66.
- Rakhshani F, Ansari Moghaddam AR, Tehrani H. Prevalence of unwanted pregnancy and associated factors in Zahedan, 1999 [in Persian]. *Res Med Sci*. 2004; **8**: 40 – 43.
- Nojomi M, Akbarian A, Ashory-Moghadam S. Burden of abortion: induced and spontaneous. *Arch Iran Med*. 2006; **9**: 39 – 45.
- World Health Organization. *Facts on Induced Abortion Worldwide*. Geneva: WHO; 2012.
- Centers for Disease Control and Prevention. Unintended pregnancy prevention. Available from: URL: <http://www.cdc.gov/reproductive-health/unintendedpregnancy> (January 4th, 2013).
- Vandenbroucke JP, von Elm E, Altman DG, Gøtzsche PC, Mulrow CD, Pocock SJ, et al. Strengthening the reporting of observational studies in epidemiology (STROBE): explanation and elaboration. *PLoS Med*. 2007; **4**: e297.
- Kahnamouee Aghdam F, Mohammadi MA, Dadkhah B, Asadzadeh F, Afshinmeh R. Outbreak and factors of unwanted pregnancy among women referring to healthcare centers of Ardabil, 2002 [in Persian]. *J Ardabil Univ Med Sci*. 2005; **5**: 167 – 171.
- Noroozi A, Khoram Roodi R, Sharifi S, Tahmasebi R. Prevalence of unwanted pregnancy and its related factors in the women covered by health centers in Bushehr Province in 2003 [in Persian]. *South Med*. 2005; **8**: 83 – 89.
- Erfani A, McQuillan K. Rates of induced abortion in Iran: the roles of contraceptive use and religiosity. *Stud Fam Plann*. 2008; **39**: 111 – 122.
- Vakili M, Shahbazi H, Dehghani MH. The prevalence of unintended pregnancies and its related demographic factors in hospitals of Yazd city - 2008 [in Persian]. *J Univ Med Sci Yazd*. 2009; **9**: 23 – 36.
- Faghihzadeh S, Babaee Rochee GB, Lmyian M, Mansourian F, Reza-soltani P. Factors associated with unwanted pregnancy. *J Sex Marital Ther*. 2003; **29**: 157 – 164.
- Higgins JPT, Green S. *Cochrane handbook for systematic reviews of interventions: version 5.0.0*. The Cochrane Collaboration; 2008. Available from: URL: [www.cochrane-handbook.org](http://www.cochrane-handbook.org).
- Aghakhani K, Kasemi SH. *Medical Malpractice in the Field of Obstetrics and Gynecology, and Prevention Strategies*. Tehran: Noor-Danesh; 2012.
- Sanaei-Zadeh H, Aghakhani K, Emamhadi MA. *Forensic Medicine*. 2nd ed. Tehran: Jahad-e-Daneshgahi; 2010.