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Prevalence and risk factors for repeat induced abortion among Chinese women: a systematic review and meta-analysis

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ABSTRACT

Objectives: Repeat induced abortion is a significant public health problem in China. International knowledge about repeat induced abortion and its associated risk factors in Chinese women is scarce, and existing studies are hard to access for international scholars because most are published in Chinese. A systematic review was conducted to analyse the prevalence of repeat induced abortion among Chinese women and determine correlated risk factors.

Methods: Seven electronic databases were systematically searched. Data on the prevalence of repeat induced abortion and related factors were extracted and pooled using a meta-analysis and narrative approach.

Results: Of 2458 articles retrieved from seven databases, 21 were included in the study. The overall pooled prevalence of repeat induced abortion was 43.1% (95% confidence interval 36.7%, 49.5%). Of 25 exposures extracted, 15 factors were significantly correlated with repeat induced abortion, comprising seven individual demographic factors (i.e., age, education, employment, migrant status, parity, unhealthy lifestyle habits and region of residence), four reproductive health-and contraception-related factors (i.e., age at sexual debut, history of sexual activity, contraceptive knowledge and having a regular sexual life) and four sexual partner-related factors (i.e., multiple sexual partners, age of sexual partner, educational level of sexual partner and cohabitation with sexual partner).

Conclusion: The study findings highlight the problem of repeat induced abortion in China and suggest the need for government and civil society to increase efforts to reduce the alarming risks of repeat induced abortion in Chinese women and make them and their sexual partners more aware and protective of their sexual and reproductive health.

Introduction

Sexual and reproductive health is fundamental to people’s health and survival, to economic development and to the well-being of humanity [1]. Unintended pregnancy and abortion are public health issues shared by people around the world [2,3]. Many women experience more than one abortion during their reproductive years [4]. Considering the adverse effects of repeat induced abortion on reproductive and other aspects of women’s health [3–6], there is a need to identify women at risk of repeat induced abortion and put in place targeted interventions [7]. Many studies have reported the prevalence of repeat induced abortion; for example, the percentage of repeat induced abortion among women undergoing induced abortion in the USA ranged between 44.8% and 58.8% [8–11]. A number of risk factors for repeat induced abortion have been identified, including demographic characteristics of women and contraception- and sexual partner-related factors [3,7–22]. Despite many international publications in this area, there is a lack of consensus regarding the risk factors for repeat induced abortion.

In China, repeat induced abortion is a significant and growing public health problem [23,24]. Induced abortion is legal and is a part of China’s family planning services [25]. With premarital sexual relationships becoming more acceptable in China, the risks of unintended pregnancy and subsequent abortion are increasing accordingly [23,24]. Furthermore, the universal two-child policy implemented in 2016 may also increase such risks [26]. Family planning services reported that in China 6.1 – 9.9 million were abortions carried out every year between 2000 and 2019 [27]. A large-scale study conducted in 30 provinces in mainland China in 2013 reported that the prevalence of repeat induced abortion among 79,174 abortion seekers was 64.8% [23]. Despite several empirical studies on this topic...
in China, only a few have been published in international journals [26], most are only available in Chinese and they draw no consistent conclusions on the prevalence and determinants of repeat induced abortion among Chinese women. Meanwhile, no related systematic review articles have been found in either Chinese or English.

This study used a systematic review of quantitative studies to examine the prevalence of repeat induced abortion in China and identify correlated risk factors.

Methods

Literature search

The study was carried out according to PRISMA guidelines [28,29]. A systematic search of the literature was performed up to December 2020 in four English language databases (PubMed, Embase, Cochrane Library and Web of Science Core Collection) and three Chinese databases (CNKI, WanFang Data and CBM). No limits were applied for language and publication dates. The following search string was adapted to each database: (repeat, repeated, repetitive or multiple) and (abortion, induced abortion or artificial abortion) and (China or Chinese). The full search strategy is shown in Supplementary Table 1.

Study eligibility

Eligible studies were those that reported the prevalence and related determining factors of repeat induced abortion among women in mainland China. The eligibility criteria were:

1. Type of studies: cross-sectional. Studies with non-original data, such as reviews, editorials, opinion papers and letters, were excluded.
2. Type of participants: studies using non-human subjects were excluded. Participants with spontaneous instead of induced abortions were excluded. The focus was on women who had undergone or were undergoing induced abortion because of unintended pregnancy.
3. Type of outcome measures: the prevalence of repeat induced abortion and related exposures had to be explicitly reported.

Eligibility assessment was conducted independently by two reviewers (JL and ZD) who screened the article titles, abstracts and full texts of all eligible studies. Disagreements were resolved by discussion with a third reviewer (HZ).

Data extraction

A piloted form of the Cochrane Effective Practice and Organisation of Care data collection checklist [30] was used to extract relevant data from the included studies. Data extraction was conducted by the first author (JL) and reviewed by the second author (ZD), with disagreements resolved by discussion until consensus was reached. The extracted data comprised author(s), publication year, study setting, sample size, age of participants, exposures and prevalence of repeat induced abortion.

Quality assessment

The quality of included studies was assessed using a modified Newcastle–Ottawa scale [31,32], recommended by the Cochrane Collaboration [33]. Studies received scores based on design-specific sources of bias, methods of sampling, exposure measures, outcome variables and methods used for controlling confounders [32]. Specifically, a study with a sample size of fewer than 1000 participants was regarded as having poor representativeness of the sample (score 0, otherwise 1), and a study that did not report a response rate or had a response rate <80% was considered poor quality (score 0, otherwise 1) [34]. If the statistical methods used were exact, the statistical test was considered to be appropriate (score 0, otherwise 1), even if multivariate analyses were not performed. The total score for a study was 7 points, and all included studies were finally grouped, based on their scores, as good (6–7 points), moderate (3–5 points) or poor (1–2 points).

Data synthesis and statistical analysis

The main outcomes included the prevalence of repeat induced abortion among women in mainland China and the related risk factors for repeat induced abortion. The overall pooled prevalence of repeat induced abortion with 95% confidence interval (CI) was calculated in a meta-analysis of 21 included studies. The significance of the pooled prevalence was tested using the Z test. Heterogeneity was estimated using the Q statistic and quantified using the $I^2$ statistic; an $I^2$-value of 0% indicated no observed heterogeneity, with larger values showing increased heterogeneity [35]. A fixed effects model was used if there was no heterogeneity, whereas a random effects model was used for $I^2 \geq 50\%$ [36]. The pooled prevalence of repeat induced abortion between studies conducted in different regions of China, published in different years and with different sample sizes, was compared by subgroup analyses.

Related risk factors for repeat induced abortion were identified using a meta-analysis or a narrative approach. Each factor subjected to meta-analysis required related variables to be the same across different studies and to be feasibly merged into two same groups. At least three studies related to each factor had to be included in the meta-analysis, and at least one study had to report that this factor was correlated or associated with repeat induced abortion. The pooled odds ratio (OR) and 95% CI were reported in the meta-analysis. The significance of the pooled OR for each feasible factor was determined by the Z test. Heterogeneity across studies for each factor was estimated and a fixed effects model or a random effects model was selected according to the value of $I^2$. Publication bias for the studies included in a meta-analysis was evaluated using Egger’s test. A two-sided $p$-value $\leq 0.05$ was considered to be statistically significant. All data were analysed using Stata statistical software, version 14.0 (StataCorp LP, College Station, TX, USA), and Review Manager (RevMan), version 5.4 (The Cochrane Collaboration, 2020).

A narrative approach and descriptive statistics were used for factors that could not be included in a quantitative synthesis and meta-analysis, by grouping studies with
the same exposures to identify their correlations with repeat induced abortion.

**Results**

A flow chart summarising the selection of relevant papers is shown in Figure 1. The initial search identified 2458 articles, from which 831 duplicate references were removed and 1606 references were excluded based on the exclusion criteria; 21 studies were retained [37-57]. No additional studies were obtained after checking the references of the 21 retrieved articles.

**Characteristics of the included studies**

All 21 included studies were cross-sectional and had been conducted in mainland China and published between 2007 and 2019: 15 studies were performed in eastern China, two in central provinces and three in the western region (Table 1). The 21 studies included a total of 31,709 participants, with a median sample size of 836 (range 230–8745). All studies investigated abortion seekers in medical institutions. The participants in eight studies were young women aged <25 years. The average score of the quality of included studies was 5.76 out of 7 points, indicating moderate research quality (Supplementary Table 2). Specifically, 14 studies were of high quality and the remaining seven studies were of moderate quality.

**Prevalence of repeat induced abortion**

The prevalence of repeat induced abortion was highest in Tianjin (64.6%; 95% CI 63.6%, 65.6%) and lowest in Guangdong (18.4%; 95% CI 15.0%, 21.8%). The overall pooled prevalence across all studies was 43.1% (95% CI 36.7%, 49.5%) (Table 2).

The subgroup analysis by region showed that the prevalence of repeat induced abortion in eastern China (43.8%; 95% CI 35.4%, 52.3%) was higher than that in the central and western regions (41.1%; 95% CI 36.0%, 46.8%). More studies were published between 2015 and 2019 (46.6%; 95% CI 37.5%, 55.7%) than between 2007 and 2014 (39.9%; 95% CI 33.2%, 46.6%). More studies had a sample size ≥836 (45.5%; 95% CI 36.9%, 54.0%) than <836 (40.4%; 95% CI 30.6%, 50.2%) (Table 2).

**Correlations found**

A total of 25 exposures were extracted from the 21 studies (Supplementary Tables 3 and 4) comprising 10 individual demographic factors, 10 reproductive health- and contraception-related factors and five sexual partner-related factors. Among them, 15 exposures were feasible for meta-analysis. Egger’s tests found no evidence of publication bias for the studies in relation to 14 factors included in the meta-analyses, except the studies relating to cohabitation with a sexual partner. Table 3 presents these results.

The meta-analyses of five reproductive health- and contraception-related factors were based on 16 studies (Figure 3). Age at sexual debut, history of sexual activity and contraceptive knowledge were significantly correlated with repeat induced abortion, i.e., women with higher risks of repeat induced abortion were <18 years at sexual debut (OR 1.51; 95% CI 1.07, 2.13), had a relatively long history of sexual activity (OR 7.59; 95% CI 3.67, 15.70) and had relatively poor contraceptive knowledge (OR 3.49; 95% CI 1.58, 7.72). The reason for current unintended pregnancy (i.e., contraceptive use at the time of conception) and contraceptive use during sexual life before the survey were not statistically significant.

Nine studies were included in the meta-analyses of three sexual partner-related factors (Figure 4). Multiple sexual partners, educational level of a sexual partner and cohabitation with a sexual partner were significantly correlated with repeat induced abortion; specifically, women having a high risk of repeat induced abortion were those who had multiple sexual partners (OR 3.15; 95% CI 1.91, 5.21), those whose sexual partners had a relatively low level of education (OR 2.07; 95% CI 1.01, 4.23) and those who cohabited with their sexual partners (OR 1.54; 95% CI 1.23, 1.92).

The remaining 10 exposures were analysed for their correlations with repeat induced abortion, using a narrative approach. In the individual demographic factors group, having unhealthy lifestyle habits such as smoking and drinking and residing in middle-developed or relatively poor regions were significantly correlated with a higher risk of repeat induced abortion. No significant correlation was found between women’s residence and repeat induced abortion.

Among reproductive health- and contraception-related factors, having a regular sexual life, compared with not having a regular sexual life, conferred a significantly higher risk of repeat induced abortion. No significant correlation was found between willingness of sexual debut and repeat induced abortion. In addition, the correlations between repeat induced abortion and three factors including a history of caesarean section, being aware of emergency contraception and having reproductive health knowledge were inconclusive.

Regarding sexual partner-related factors, women whose partners were >24 years were found to have a significantly higher risk of repeat induced abortion than those with partners aged ≤24 years. The correlation between duration of cohabitation with a sexual partner and repeat induced abortion was inconclusive.

**Discussion**

**Findings and interpretation**

To the best of our knowledge, this study, is the first systematic review and meta-analysis in Chinese women of the repetition of induced abortion.
prevalence of repeat induced abortion and its potential risk factors. The overall prevalence of repeat induced abortion in Chinese women was 43.1%, which is much higher than that of female abortion seekers elsewhere in the world: UK (19.2% ± 26.8%) [7,12,13], Switzerland (30.1%) [14], Norway (36.7%) [15], Netherlands (36.0%) [17], Ethiopia (20.3% ± 34.9%) [18–20], Canada (31.8%) [21] and Tunisia (42.2%) [22]. No direct evidence has been found about why Chinese women have a higher prevalence of repeat induced abortion; however, this difference might be relevant to the gap in sexual education and contraceptive practice in China compared with other, particularly developed, countries [39]. Furthermore, the study identified an increase in the prevalence of repeat induced abortion among Chinese women from 39.9% between 2007 and 2014 to 46.6% between 2015 and 2019, which might have been affected by China’s two-child policy [26].

Seven individual demographic risk factors were found to have significant correlations with repeat induced abortion: women who were older (≥ 20 years), had a lower level of...
education (<junior college), were unemployed, were migrants, were parous, had unhealthy lifestyle habits (such as smoking and drinking) and resided in middle-developed or relatively poor regions had a significantly higher risk of repeat induced abortion. One interesting finding is that, although low educational level, unemployment and migrant status were significantly correlated with repeat induced abortion, low monthly income, which is closely associated with the above factors, was not a risk factor for repeat induced abortion. The difference may be due to the limited number of studies related to income that were included in the meta-analysis. Some of these findings are in line with those of studies performed in the USA [8–10], UK [12,13], Switzerland [14], Norway [15], Italy [16] and Tunisia [22]. However, Alemayehu et al. [20] found that younger abortion seekers in Ethiopia had a significantly higher risk of repeat induced abortion, and Picavet et al. [17] reported a significant association in the Netherlands between a higher level of education and a higher risk of repeat induced abortion. Studies in other countries did not identify any significant associations of repeat induced abortion with age [19], education [11], employment [19] and parity [14,18].

In terms of reproductive health- and contraception-related factors, four risk factors were found to be significantly correlated with repeat induced abortion among

### Table 2. Meta-analysis of the prevalence of repeat induced abortion among Chinese women.

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>No. of studies</th>
<th>No. of participants</th>
<th>Q test, % ($I^2$)</th>
<th>p-value ($Z$ test)</th>
<th>Prevalence, % (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>21</td>
<td>31,709</td>
<td>99.3</td>
<td>&lt;.001</td>
<td>43.1 (36.7, 49.5)</td>
</tr>
<tr>
<td>By region</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>East</td>
<td>15</td>
<td>23,493</td>
<td>99.4</td>
<td>&lt;.001</td>
<td>43.8 (35.4, 52.3)</td>
</tr>
<tr>
<td>Central and west</td>
<td>5</td>
<td>5846</td>
<td>99.2</td>
<td>&lt;.001</td>
<td>41.1 (36.0, 46.8)</td>
</tr>
<tr>
<td>By year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007 – 2014</td>
<td>11</td>
<td>9767</td>
<td>97.9</td>
<td>&lt;.001</td>
<td>39.9 (33.2, 46.6)</td>
</tr>
<tr>
<td>2015 – 2019</td>
<td>10</td>
<td>21,942</td>
<td>99.4</td>
<td>&lt;.001</td>
<td>46.6 (37.5, 55.7)</td>
</tr>
<tr>
<td>By sample size</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;836</td>
<td>10</td>
<td>4291</td>
<td>97.9</td>
<td>&lt;.001</td>
<td>40.4 (30.6, 50.2)</td>
</tr>
<tr>
<td>≥836</td>
<td>11</td>
<td>27,418</td>
<td>99.5</td>
<td>&lt;.001</td>
<td>45.5 (36.9, 54.0)</td>
</tr>
</tbody>
</table>

### Table 3. Meta-analyses of 15 exposures.

<table>
<thead>
<tr>
<th>Exposure</th>
<th>No. of studies</th>
<th>No. of participants</th>
<th>Comparison model</th>
<th>$I^2$ (%)</th>
<th>p-value</th>
<th>Statistical model</th>
<th>Pooled OR (95% CI)</th>
<th>p-value ($Z$ test)</th>
<th>p&gt;$t$ (Egger's test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual demographic factors ($n = 7$)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>5</td>
<td>8741</td>
<td>≥20 years vs &lt;19 years</td>
<td>87</td>
<td>&lt;.001</td>
<td>M–H, random effects</td>
<td>1.65 (1.05, 2.58)</td>
<td>.03</td>
<td>0.663</td>
</tr>
<tr>
<td>Education</td>
<td>9</td>
<td>10,959</td>
<td>&lt;Junior college vs ≥ junior college*</td>
<td>89</td>
<td>&lt;.001</td>
<td>M–H, random effects</td>
<td>1.52 (1.14, 2.01)</td>
<td>.004</td>
<td>0.163</td>
</tr>
<tr>
<td>Employment</td>
<td>5</td>
<td>7205</td>
<td>Unemployed vs employed</td>
<td>83</td>
<td>&lt;.001</td>
<td>M–H, random effects</td>
<td>1.58 (1.12, 2.21)</td>
<td>.008</td>
<td>0.096</td>
</tr>
<tr>
<td>Migrant status</td>
<td>11</td>
<td>17,656</td>
<td>Migrant vs non-migrant</td>
<td>89</td>
<td>&lt;.001</td>
<td>M–H, random effects</td>
<td>1.23 (1.00, 1.51)</td>
<td>.05</td>
<td>0.654</td>
</tr>
<tr>
<td>Marriage</td>
<td>7</td>
<td>7466</td>
<td>Married vs unmarried</td>
<td>97</td>
<td>&lt;.001</td>
<td>M–H, random effects</td>
<td>1.20 (0.64, 2.27)</td>
<td>.57</td>
<td>0.449</td>
</tr>
<tr>
<td>Parity</td>
<td>6</td>
<td>16,604</td>
<td>Yes vs no</td>
<td>97</td>
<td>&lt;.001</td>
<td>M–H, random effects</td>
<td>1.79 (1.08, 2.96)</td>
<td>.02</td>
<td>0.863</td>
</tr>
<tr>
<td>Monthly income</td>
<td>5</td>
<td>3682</td>
<td>Relatively low vs relatively high</td>
<td>66</td>
<td>.02</td>
<td>M–H, random effects</td>
<td>1.20 (0.93, 1.55)</td>
<td>.16</td>
<td>0.719</td>
</tr>
<tr>
<td>Reproductive health- and contraception-related factors ($n = 5$)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age at sexual debut</td>
<td>4</td>
<td>3758</td>
<td>&lt;18 years vs ≥18 years</td>
<td>70</td>
<td>.02</td>
<td>M–H, random effects</td>
<td>1.51 (1.07, 2.13)</td>
<td>.02</td>
<td>0.381</td>
</tr>
<tr>
<td>History of sexual activity</td>
<td>4</td>
<td>1880</td>
<td>Relatively long vs relatively short</td>
<td>91</td>
<td>&lt;.001</td>
<td>M–H, random effects</td>
<td>7.59 (3.67, 15.70)</td>
<td>&lt;.001</td>
<td>0.217</td>
</tr>
<tr>
<td>Reason for current unintended pregnancy</td>
<td>10</td>
<td>11,552</td>
<td>Ineffective contraception vs non-use of contraception</td>
<td>93</td>
<td>&lt;.001</td>
<td>M–H, random effects</td>
<td>1.17 (0.85, 1.61)</td>
<td>.33</td>
<td>0.507</td>
</tr>
<tr>
<td>Contraceptive use during sexual life before survey</td>
<td>5</td>
<td>7404</td>
<td>Yes vs no</td>
<td>95</td>
<td>&lt;.001</td>
<td>M–H, random effects</td>
<td>0.99 (0.56, 1.77)</td>
<td>.98</td>
<td>0.320</td>
</tr>
<tr>
<td>Contraceptive knowledge</td>
<td>3</td>
<td>4870</td>
<td>Relatively poor vs relatively good</td>
<td>95</td>
<td>&lt;.001</td>
<td>M–H, random effects</td>
<td>3.49 (1.58, 7.72)</td>
<td>.002</td>
<td>0.640</td>
</tr>
<tr>
<td>Sexual partner-related factors ($n = 3$)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiple sexual partners</td>
<td>6</td>
<td>4673</td>
<td>Yes vs no</td>
<td>88</td>
<td>&lt;.001</td>
<td>M–H, random effects</td>
<td>3.15 (1.91, 5.21)</td>
<td>&lt;.001</td>
<td>0.661</td>
</tr>
<tr>
<td>Educational level of sexual partner</td>
<td>3</td>
<td>3837</td>
<td>Relatively low vs relatively high</td>
<td>95</td>
<td>&lt;.001</td>
<td>M–H, random effects</td>
<td>2.07 (1.01, 4.23)</td>
<td>.05</td>
<td>0.156</td>
</tr>
<tr>
<td>Cohabitation with sexual partner</td>
<td>5</td>
<td>6359</td>
<td>Yes vs no</td>
<td>73</td>
<td>.005</td>
<td>M–H, random effects</td>
<td>1.54 (1.23, 1.92)</td>
<td>&lt;.001</td>
<td>0.039</td>
</tr>
</tbody>
</table>

*In China, after graduating from senior high school, junior college can provide a 3 year training programme for a diploma certificate (education to 21 years old in normal conditions), which is lower than a bachelor's degree. M–H: Mantel–Haenszel.
In line with other studies [12,19], the present study found that women who were younger at sexual debut had a significantly higher risk of repeat induced abortion. A significant correlation between poor contraceptive knowledge and a high risk of repeat induced abortion was also found, which was consistent with the report of a Tunisian study [22]. In the present study, having a long history of sexual activity and having a regular sexual life were correlated with a high risk of repeat induced abortion; however, no relevant studies were found in this regard in other countries. Although studies in the USA, Norway, the Netherlands, Georgia and Kenya found that contraceptive

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### Table 1: Demographic Factors and Repeat Induced Abortion

<table>
<thead>
<tr>
<th>Age</th>
<th>Events</th>
<th>Total</th>
<th>Weight</th>
<th>Odds Ratio M-H, Random, 95% CI</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;20 years</td>
<td>1523</td>
<td>3335</td>
<td>117</td>
<td>229</td>
<td>22.7%</td>
</tr>
<tr>
<td>≥20 years</td>
<td>74</td>
<td>384</td>
<td>17</td>
<td>110</td>
<td>17.5%</td>
</tr>
<tr>
<td>Chi-square = 6.92, df = 4, p = 0.040</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 2: Employment and Repeat Induced Abortion

<table>
<thead>
<tr>
<th>Employment</th>
<th>Events</th>
<th>Total</th>
<th>Weight</th>
<th>Odds Ratio M-H, Random, 95% CI</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployed</td>
<td>754</td>
<td>1906</td>
<td>173</td>
<td>462</td>
<td>12.7%</td>
</tr>
<tr>
<td>Employed</td>
<td>711</td>
<td>1536</td>
<td>929</td>
<td>2014</td>
<td>13.8%</td>
</tr>
</tbody>
</table>

### Table 3: Education and Repeat Induced Abortion

<table>
<thead>
<tr>
<th>Education</th>
<th>Events</th>
<th>Total</th>
<th>Weight</th>
<th>Odds Ratio M-H, Random, 95% CI</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Junior college</td>
<td>151</td>
<td>3335</td>
<td>117</td>
<td>229</td>
<td>22.7%</td>
</tr>
<tr>
<td>College</td>
<td>754</td>
<td>1906</td>
<td>173</td>
<td>462</td>
<td>12.7%</td>
</tr>
</tbody>
</table>

### Table 4: Migrant Status and Repeat Induced Abortion

<table>
<thead>
<tr>
<th>Migrant status</th>
<th>Distance</th>
<th>Events</th>
<th>Total</th>
<th>Weight</th>
<th>Odds Ratio M-H, Random, 95% CI</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Migrant</td>
<td>422</td>
<td>1145</td>
<td>476</td>
<td>1157</td>
<td>10.3%</td>
<td>0.84 (0.73, 0.98)</td>
</tr>
</tbody>
</table>

Figure 2. Forest plots showing meta-analysis of seven individual demographic factors. M-H: Mantel–Haenszel.
use at the time of conception and in the 6 months beforehand was a risk factor for repeat induced abortion [8,15,17,58,59], our study could not identify any such correlations in China.

We found that four sexual partner-related risk factors were significantly correlated with repeat induced abortion. Having multiple sexual partners was significantly correlated with a high risk of repeat induced abortion among abortion seekers, which has also been well documented in studies in the UK [12] and Ethiopia [18,19]. Also, our study found that older age of the sexual partner, lower level of education of the sexual partner and cohabitation with the sexual partner were significantly correlated with a high risk of repeat induced abortion; however, these factors have rarely been reported in studies in other countries.

**Strengths and weaknesses**

As the first systematic review and meta-analysis to depict the overall prevalence of repeat induced abortion in Chinese women and to determine the potential risk factors, this study contributes to our understanding of the sexual

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**Figure 3.** Forest plots showing meta-analysis of five reproductive health- and contraception-related factors. M–H: Mantel–Haenszel.
and reproductive health of women in China. A major strength is that it estimated the pooled prevalence of repeat induced abortion based on 21 studies comprising a large sample size of 31,709 participants and used meta-analysis. Another strength is that it determined the correlations of a broad scope of potential risk factors using a meta-analysis and narrative approach.

However, the findings should be interpreted with caution in light of several limitations. The major limitation is the relatively high heterogeneity that could not be eliminated among the studies included in the meta-analyses. The heterogeneity likely reflects differences in: (1) questionnaires used in different studies, which in many cases were designed ad hoc for a specific study; (2) how the surveys were conducted, e.g., with or without trained research assistants; (3) year of the survey; (4) study population; (5) sample size; and (6) research region. As the number of studies included in the meta-analyses, especially for each feasible factor, was very limited, we did not further conduct heterogeneity analysis using meta-regression. A second limitation relates to multiplicity, which in systematic reviews can arise from multiple outcomes, multiple groups, multiple time points, multiple effect measures, etc [60]. In our study, when planning meta-analyses of the risk factors for repeat induced abortion, we (re-)categorised each feasible factor into two groups and included at least three related studies in a meta-analysis. However, there remain difficulties relating to representativeness of the included data. As there is no satisfactory solution to this problem [33], the possibility of a type I error as a result of multiplicity cannot be ruled out. A third limitation is that the study populations came primarily from eastern provinces and metropolitan areas, such as Beijing, Shanghai, Guangdong and Zhejiang; therefore, our findings are not fully representative of all Chinese women. More work should be done focussing on the sexual and reproductive health of women in the western and central regions of China. Finally, because of the limitations and shortage of current studies, some potential risk factors for repeat induced abortion, such as intimate partner violence, which has been well documented in studies in other countries, were not analysed. More research is needed to identify the various factors that put Chinese women at high risk of repeat induced abortion.

Relevance of the findings: implications for policy-makers

Our study indicates that high risks of unintended pregnancy and repeat induced abortion remain considerable challenges to women’s sexual and reproductive health in China. Our findings suggest the need for government and civil society to increase their efforts to make Chinese women and their potential partners more aware of sexual and reproductive health. The study extracted a broad scope of 25 related factors and determined their correlations with repeat induced abortion, identifying a total of 15 risk factors. Urgent actions are needed to strengthen sexual and reproductive health services, sexuality education and counselling for women in China. The population at a high risk of repeat induced abortion requires greater attention from family planning policy-makers and government
agencies. Related intervention strategies could be formulated or adjusted, or reproductive health care programmes optimised, to reduce the alarming risks of unintended pregnancy and repeat induced abortion in China.

Conclusion
This study is the first systematic review of the prevalence and risk factors for repeat induced abortion among women in China. The high prevalence of 43.1% highlights the problem of repeat induced abortion among Chinese women. A total of 15 risk factors were found to be significantly correlated with repeat induced abortion in Chinese women, comprising seven individual demographic factors (i.e., age, education, employment, migrant status, parity, unhealthy lifestyle habits and region of residence), four reproductive health- and contraception-related factors (i.e., age at sexual debut, history of sexual activity, contraceptive knowledge and having a regular sexual life) and four sexual partner-related factors (i.e., multiple sexual partners, age of sexual partner, educational level of sexual partner and cohabitation with a sexual partner). The findings suggest the need for government and civil society to increase their efforts to reduce the alarming risks of unintended pregnancy and repeat induced abortion in Chinese women and make them and their sexual partners more aware and protective of their sexual and reproductive health.

Disclosure statement
No potential conflict of interest was reported by the author(s).

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References


