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Direct and Indirect Estimation of Intentional Abortion and Exploring Its Related Causes, Methods and Consequences in the Last 5 Years in Women in Tehran: A Mixed Methods Study Protocol

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ABSTRACT

Background & aim: Unsafe abortion is a major issue in developing countries. Legal, cultural, religious, and customary challenges surrounding the issue of intentional abortion limit direct assessment of the status of intentional abortion and its associated factors in different regions of the world. Therefore, indirect methods of inquiry are useful in this sensitive issue. In direct estimation, the answers to the questions are direct and clear, but in indirect estimation, non-random answers are used. This study aims to estimate the rate of intentional abortions in Tehran over the past five years and to explore its related causes, methods, and consequences.

Methods: This sequential explanatory mixed-methods study will be conducted in Tehran, Iran. In the first stage, a descriptive cross-sectional study will be conducted on 831 women aged 15 to 49, using random sampling and a four-part quantitative questionnaire. Then, the data will be analyzed by SPSS 22 software using Fisher's exact test, chi-square, and regression model. In the second stage, based on the results of the first stage, a qualitative study will be conducted with purposeful selection of participants (women seeking intentional abortion), with a qualitative content analysis approach until data saturation. Finally, both quantitative and qualitative data sets will be integrated to form a comprehensive interpretation.

Discussion: Using indirect methods for investigating sensitive topics such as intentional abortions, that individuals may conceal, could provide a more accurate estimate of this issue, which can be used to design and implement healthcare programs for all people with unsafe abortions.

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Introduction

Intentional abortion is the termination of a pregnancy by medical or surgical means before the fetus is viable, either performed safely or unsafely outside the legal system (1). Unsafe abortion is defined as a procedure for terminating a pregnancy by unskilled personnel

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or in settings that lack minimum medical standards, or both (2). A 2015 report from low-income countries estimated that 7 million women were treated for complications related to unsafe abortion (an estimated rate of 6.9 per 1000 women). However, when a number of these countries where abortion was legal and widely available were excluded, this rate increased to 7.4 per 1000 women (3).

In Iran, abortion without medical indications is legally impossible, and therefore, illegal and unsafe abortions could be performed (4). According to the resolution of the Islamic Consultative Assembly, abortion is permitted under the following single article:

"Therapeutic/medical abortion is permitted, in cases that there is a definitive diagnosis by three specialist doctors and confirmation by a forensic physician that the fetus has a disease possibly cause mental retardation or organ defects after birth, or a disease that threatens the mother's life, or severe and incurable abnormalities that will cause unbearable hardship and suffering for the mother after birth. This procedure is permissible with the woman's consent before the fourth month of pregnancy (before the soul is breathed into the fetus), and under these circumstances, the treating physician will not be held rresponsible". Therefore, according to this law, abortion in cases other than those mentioned is considered a crime under the Islamic Penal Code and is considered against Sharia (5).

Critics of Iran's new pronatalist population policies argue that limited access to contraceptives and reproductive health knowledge increases the number of unintended pregnancies and illegal abortions. Simply put, when most couples prefer to have one or two children, restricting family planning services and prenatal screening not only does not increase fertility rates, but also leads to increased abortion rates and related outcomes (6). Restricting access to prenatal screening and enforcing strict abortion laws may appear to reduce the number of medical abortions. However, in reality, they may lead to an increase in unsafe abortions (7). Abortion is more common among women from lower socioeconomic classes. It is believed that the new restriction on access to family planning services could negatively impact couples living in rural areas rather than urban areas, as before the new law, many of them relied on free contraceptives provided by health centers (8). Also, economic problems and family disputes are among the factors influencing abortion (6). Policymakers need to consider that Iran is a vast country with diverse economic, social, and cultural groups, resulting in differences in fertility preferences and attitudes toward population policies and abortion (9-10).

Due to the sensitive nature of the phenomenon and the strict abortion laws, there are no official statistics on abortion in Iran. It is estimated that 300,000 to 600,000 illegal abortions are performed in Iran annually (11). However, there are no accurate statistics on the actual rate of abortion in Iran. According to the results of the Iran Demographic and Health Survey (IDHS) (2023), on average, Iranian women have experienced 1.071 abortions during their reproductive years (12). In a study by Zendehdel et al. (2024), results showed that 9.4% of married women (one in 11 married women) in the southern region of Tehran, Iran, had at least one induced abortion (9). A systematic review and meta-analysis by Shahraki Mojahid (2019) found that the prevalence of induced abortion in Iran was 21%(13). A systematic review and meta-analysis by Dastgiri (2017) found that the overall rate of induced abortion in Iran was 26.84 per 1000 fertile women based on a random effects model (14). However, these figures do not seem to correspond to the reality of the situation in Iran, as they do not cover the activities of illegal centers (15).

Another factor that may play a role in underreporting and inaccuracy of abortion rates is abortion stigma (10, 17), which is defined as a common perception that it is morally wrong and/or socially unacceptable has limited women's access to safe and quality abortion services and care (16). Legal restrictions and stigma surrounding abortion make it invisible, as those who have had an abortion are reluctant to disclose it (10, 17). This problem goes beyond culture and law, and even in societies with legal abortion policies, underreporting accounts for 70% of cases (10).

Due to the social stigma and laws, direct estimates of abortion rates by face-to-face

interviews may lead to underestimates of the true prevalence. In this context, indirect methods have been proposed to estimate the size of hidden and stigmatized subpopulations (10, 18). Indirect methods are used to address sensitive social issues or highly confidential matters, such as illegal abortions, unwanted pregnancies, human immunodeficiency virus (HIV) infection, and drug abuse. When directly confronted with sensitive questions, individuals may intentionally or unintentionally refrain from providing personal information for reasons such as fear of disclosure or perceived privacy violations. This, in turn, can lead to biases due to incorrect or non-response, thereby compromising the validity of study results. To address such challenges, researchers are constantly looking for solutions that can ameliorate such biases and enhance the validity of their study findings (19-21).

Among indirect methods, network up scaling (NSU) is an attractive method that does not require direct contact with the target population (10, 22). This method preserves anonymity because respondents respond on behalf of their network rather than themselves. NSU is a valid tool for estimating the size of latent groups (23). The single-sample count (SSC) technique is another effective indirect method. In this method, participants are given a list of sentences containing several insensitive sentences with a specific distribution, plus one sensitive sentence (10, 18). In one study, Zamanian et al. (2019) used three methods to estimate the prevalence of abortion, which were based on direct questioning, network scaling up (NSU), and single-sample count (SSC). The results showed that the annual abortion rates estimated by the direct and NSU methods were 29 (10 intentional, 4 therapeutic, and 15 spontaneous) and 23 (9 intentional, 3 therapeutic, and 11 spontaneous) per 1,000 women aged 18–49 years, respectively. The estimated annual rate of intentional abortion based on the SSC method (15 cases per 1,000 women) was higher than other methods (10). These indirect methods face limitations, including: the high probability of non-compliance with the instructions of its various models by respondents who either misunderstood the instructions or did not trust the method, increased study costs due to the need for extensive training to increase actual respondent participation, additional burden on respondents due to the mandatory use of a randomization device, which can lead to non-random responses, especially in cases of self-report, the possibility of self-protection bias among both groups of individuals (those who have engaged in sensitive behavior and those who have not) (24).

Another indirect method, the crosswise model, is a non-randomized response technique that has also been used in medical research on sensitive topics in Iran (25-26) . This method will be used in the present study.

On the other hand, extensive studies that have been conducted in the past on estimating abortion have been conducted over a period of more than three years, and as we know, with the passage of time, and also with the progress made and the modernization of life, the abortion rate is affected by many factors (9). For example, the study by Motaghi et al., conducted in 2013 to triangulate the cause of induced abortion in Iran was not relevant for estimating abortions in the present time. This is because the study was conducted 12 years ago and involved 28 married women, 10 engaged women with a history of unintended pregnancy or unsafe abortion, and 12 service providers in health centers and several gynecologists' and midwives' offices. Sampling of women with a history of unintended pregnancy or unsafe abortion, such as single women, HIV-positive women, drug users, and women who had sex for money, began with referrals to a women's social rehabilitation center and continued using the snowball method (27). Therefore, considering the above-mentioned cases, this study will be conducted to estimate the rate of direct and indirect intentional abortions in Tehran over the past five years and to explore its related causes, methods, and related consequences using a mixed methods approach.

The specific objectives of this study are:

1- To determine and compare direct and indirect estimates of attempted intentional abortions following unwanted pregnancies in the past 5 years in Tehran

2- To determine individual and reproductive characteristics (except age and marital status) with a history of intentional

abortions using direct estimates in the past 5 years in Tehran

3- To determine the frequency of intentional abortions causes, common methods, and post-operative complications associated with intentional abortion using direct estimates in the past 5 years in Tehran

4- To determine the frequency of individuals performing intentional abortions using direct estimates in the past 5 years in Tehran

5- To explore women's perceptions and experiences of the causes, methods, and outcomes associated with intentional abortion based on the findings of the quantitative phase of the study.

Materials and Methods

In this study, an explanatory mixed-methods design will be used. This type of study collects and analyzes data obtained from a quantitative methodology before qualitative study, and combines the two data sets together at the end of study to form an integrated and thorough interpretation.

In the present study, the use of a mixed approach in research is a way that could lead to more in-depth analysis of the phenomenon under study, using the philosophy of pragmatism (28). Since abortion is an important issue in terms of health and medicine, and contextual, cultural, social, and economic factors play a role in understanding and answering questions related to it, it cannot be studied with just one specific method. On the one hand, the researcher is looking for practical ways to get answers; therefore, a mixed approach in research and also the philosophy of pragmatism are more consistent with this research (29). On the other hand, because abortion is a culturally sensitive issue, all its dimensions cannot be examined with just a few questions, and there is a need to hear the voices of women and explore their experiences in their own words (4).

The present study will be conducted in two stages, and the quantitative and qualitative phases are interrelated, and the data will be integrated through the descriptions of the quantitative phase and the experiences of the qualitative phase (Figure1).

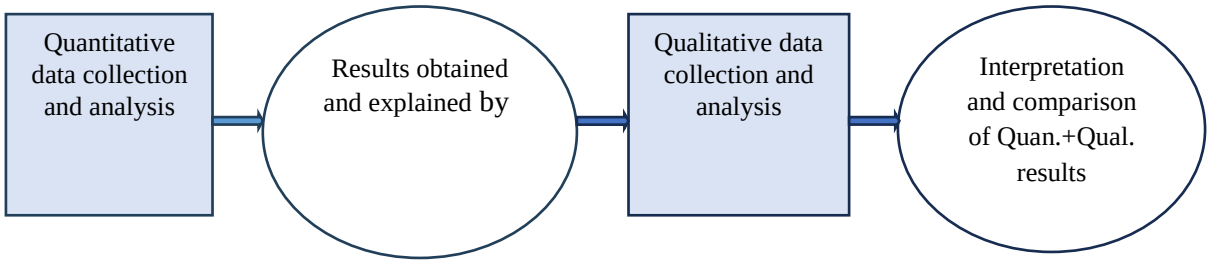

Figure 1. The diagram of sequential explanatory mixed-methods study

Quantitative Phase:

The design of this section will be a descriptive cross-sectional study. The indirect method that will be used in this study is the crosswise model. The crosswise model is a non-randomized response technique that has also been used in medical research on sensitive topics in Iran. The crosswise model aims to do this by pairing a sensitive target item with a non-sensitive baseline item, and only asking participants to indicate whether their responses to the two items are the same or different. Selection of the baseline item is crucial to guarantee participants' perceived and actual privacy and to enable reliable estimates of the sensitive traits (25-26) .

The research population in this study will include all women of reproductive age (15-49 years) in Tehran, from whom the research samples will be selected based on the inclusion criteria. The inclusion criteria for the study will be: women aged 15-49 married (either as permanent or temporary marriage, divorced, separated, and widowed), residing in Tehran, having at least minimum literacy, being Iranian and Muslim, having no known mental illnesses based on self-report, and no intellectual disability.

Individuals with a history of medical abortion with legal permission and spontaneous abortion, or without consent to continue cooperation, will not be included in the study. As mentioned, two direct and indirect methods are used to estimate intentional abortion in this study. In the indirect estimation method, the crosswise model, which is one of the non-randomized response techniques, are used, in which the respondents are given a pair of independent questions, including a sensitive question and a non-sensitive question, which they had to answer with "A" or "B" (Table 1). The way of answering in the cross-wise model is that the respondent is asked to choose option "A" if the answer to both questions is the same (both yes or both no), and to choose option "B" if the answer to both questions are different (one yes and the other no).

In order to estimate the relative frequency of abortion in the direct method, using the formula for estimating the frequency of a trait with a certain accuracy and considering a p-value of about 10 percent and an error rate of 3 percent, the required sample size was calculated as 396 people.

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

$Z_{1-\frac{\alpha}{2}} = 1.96$

P = 0.1

d =0.03

In order to estimate the number of sample in the crosswise model, in addition to estimating the prevalence or frequency of the trait, the frequency of positive responses in the non-sensitive question is also needed. Based on the following formula (38), the number of samples is calculated for each non-sensitive question, and finally, the largest number (831 samples) is considered. The final sample size calculation is performed by substituting the relevant numbers according to the aforementioned formula with two different probabilities of a positive response to the non-sensitive questions (i.e. 0.25 and 0.33) in the Excel defined as shown in the image below, and the largest sample size number is selected.

$Z_{1-\frac{\alpha}{2}} = 1.96 L_0$ = 0.2

L_0 The maximum confidence interval around the prevalence of the sensitive trait depends on the level of accuracy of the estimates that are being made.

P = 0.33

P The probability of a positive response to the non-sensitive question asked in the study and known in advance.

Sampling method: After the study was approved, the process of collecting the desired samples began. From all the health centers in the south of Tehran (about 90 centers/covered by Tehran University of Medical Sciences), 12 health centers are randomly selected using the website www.random.org in proportion to the original sample size and the population covered. Given that the number of sample required to complete the questionnaires in the indirect quantitative section is about twice that of the direct quantitative section, about two-thirds of the centers were allocated to the indirect sample section (8 centers) and one-third to the direct sample section (4 centers). Then, a list of national codes for women are prepared based on the electronic health records in each center. From the prepared list, the number of sample required for each center is determined using a proportional method. Therefore, the sampling method in both the direct and indirect estimation groups will be the same, and each person completed the direct or indirect estimation questionnaire based on which health center they are covered. Using the telephone number registered in each file, the researcher contacts the women, and after providing the necessary explanations about the study, the eligible individuals are invited to participate in the study. If the individual's eligibility is confirmed, the objectives and method of the study are fully explained, and if they wished to participate in the study, written informed consent is obtained from them. The participants are assured that their names and information would remain confidential and that the results would be reported anonymously. Depending on the women's desire to determine the time of referral, the relevant questionnaire (along with the instructions for completing it) are completed on self-report basis in a quiet and private room. The researcher and trained research assistants

will answerany questions participants might have at the centers.

The data collection tool in the direct estimation group is the tool designed and validated by Motaghi (2013) in her mixed methods study focused on the status of unsafe abortion in Iran. The validity of this questionnaire was confirmed using face and content validity and its reliability with Cronbach's alpha coefficient of 0.89 (27). This tool consists of four following sections: 1) demographic characteristics," including questions about age, marital status, education, occupation of the woman, and adequacy of family income; 2) "history of intentional abortion and characteristics of the individual's marital life" consisting of questions on history of intentional abortion, marital status at the time of abortion, age, education, and occupation of the spouse, and marital status and type, some of which are completed only by individuals with a history of intentional abortion; 3) "obstetric characteristics," including questions about the number of pregnancies and deliveries, duration of the first pregnancy after marriage, number of living children, number of daughters and sons, and presence of a child with a congenital anomaly and 4) "questions related to characteristics of intentional abortion," which will be completed only by individuals with a history of intentional abortion and includes five questions of general characteristics of intentional abortion, reason for intentional abortion, method and process of intentional abortion, complications of intentional abortion, and contraceptive method.

To do the statistical analysis in the direct estimation questionnaire, descriptive statistics will be used to describe the data according to the nature of the variables. For quantitative variables, in addition to the minimum and maximum values, the mean and standard deviation will be reported. Also, for these variables, a histogram are used to describe the distribution of the variables. For qualitative variables, frequency and percentage will be used. Also, tables and, in some cases, a pie chart are used to describe the distribution of the variables.

Independent t-test analysis will be used to compare the mean scores of quantitative variables in two groups with and without intentional abortion. In the analysis of qualitative variables, the chi-square test is used, and if the assumptions of this test are not met, Fisher's exact test will be used to examine the difference in the distribution of variables. A p-value of less than 0.05 is considered a significant level. Statistical analyses will be performed using SPSS version 26 software.

To perform statistical analysis in the indirect estimation questionnaire, prevalence estimation will be done using the crosswise method for the following 4 questions: 1) History of intentional abortion in the last 5 years 2) History of intentional abortion in the last 5 years following an unwanted pregnancy 3) Age 25 years or younger at the time of attempted intentional abortion and 4) Marital status single (illegitimate pregnancy) at the time of attempted intentional abortion.The following formula will be used to estimate the prevalence of each question:

$\pi=(\lambda+(p-1))/(2p-1)$

In the above formula, π is the estimated prevalence size. In this formula, λ means the proportion of people who chose option A (the answer to both questions are the same, both yes or both no), and p means the probability of a positive answer to the insensitive question.

The following formula will be used to calculate the prevalence confidence interval. To calculate the 95% CI, the variance and standard error are first calculated and then inserted into the confidence interval formula, and Excel software will be used to perform the calculations.

$$\mathrm{var}(\pi) = \frac{\lambda(1-\lambda)}{(n-1)(2p-1)^2}$$

$$\mathrm{SE}(\pi) = \sqrt{\frac{\lambda(1-\lambda)}{(n-1)(2p-1)^2}}$$

$$95\%\ \mathrm{CI}\ (\pi) = \pi \pm z_{\alpha/2} \times \mathrm{SE}(\pi)$$

Qualitative phase

After analyzing the data of the quantitative phase and purposefully selecting the participants (women who have attempted an abortion), a qualitative content analysis study will be conducted to gain a deep understanding of the subject under study. Finally, by combining the findings of the two phases of the study, a general and integrated interpretation will be presented

towards the study objectives. The research population in this study will be all women of reproductive age (15-49 years) in Tehran with a history of an abortion. The location of the interviews in this study will be a real and natural environment, and the interviews will be conducted in any location that is most convenient to the participants.

Participants in this phase of the study will be selected based on the results of the quantitative phase with the greatest diversity inorder to be able to express useful and rich information. Therefore, the approach used for sampling in the first phase of the study will be purposive sampling.

Participants in the qualitative phase will include: people with a history of intentional abortion based on the results of the quantitative phase and the direct assessment group questionnaire, people with a history of multiple intentional abortions, people with answers outside the scope of the questionnaire used in the quantitative phase (Part IV, sections B, C and D), people with long-term complications or the need for hospitalization due to intentional abortion.

After inviting participants to take part in the individual interviews, the time and place of conducting the interviews will be determined by the participants' own choice. Subsequent participants will be selected based on the results of stage 1 and continuous analysis and questioning of the data, taking into account the maximum variation and different characteristics (in terms of age, education, number of children, socioeconomic status, education, and employment status of the mother), as well as the greatest diversity in the method, causes, and consequences of intentional abortion based on the direct group questionnaire.

In this stage, in-depth and semi-structured individual interviews will be used to collect qualitative data according to the guiding questions. Before conducting the research, an interview guide will be prepared and ways to obtain valid data from the interview and how to focus on the research questions will be reviewed by the researchers. In-depth and exploratory questions will be designed based on the type of responses to obtain further in-depth explanations. After coordinating the interview time, the researcher will asks the participants to read the informed consent form and sign it if they wish to participate in the study. The interview will begin by establishing rapport and gaining the participants' trust, and after a brief explanation of the importance of the research topic in a language that the participants can understand. Then, interview questions will be asked based on the interview guide. Also, probing questions such as "What do you mean" or "If you can explain more", will be used in the continuation of the interviewto probe further data. At the end of the interview, the participant will be asked to state if there is anything left to say and then the possibility of further interviews will be discussed with her at the end of the interview. Also, the researcher will record non-verbal data such as tone of voice, facial expressions, and the participants' posture in a special sheet, indicating the time and place of the interview. The number of interview sessions will depend on the participant's condition and receiving his answers to the research questions. In general, an attempt will be made to ask simple and general questions in accordance with the interview guide, and then proceed to more specific and detailed questions based on the participants' responses and experiences. The interviews will be recorded with the participant's permission and then transcribed verbatim and will be checked with the participants to confirm their accuracy. As the interviews continue, new questions may be added to the interview guide. In other words, in semi-structured interviews, in most cases the questions are not fixed but rather are flexible and formed based on the interview process.

Some interview guide questions will be: "Please let me know how do you think about intentional abortion? I mean, what your beliefs are in this regard?"; "Please tell me about your experiences with intentional abortion"; "In your opinion, what are the reasons for intentional abortion?"; "Could you please inform me of your reasons for choosing abortion?"; "What problems and complications did you have after the abortion?"; and "Please let me know about your feelings before and after having an abortion".

Data analysis in the qualitative phase of the study will be conducted based on the content

analysis approach and using MAXQDA-18 software. In this study, conventional content analysis will be used (30) and qualitative content analysis will be conducted using the method proposed by Zhang & Wildemuth (2016) in the following eight steps:

1. Preparing data for qualitative content analysis
2. Deciding on the unit of analysis
3. Classification of concepts
4. Testing coding in a sample of the text
5. Extending the testing coding process to the entire text
6. Accessing coding consistency
7. Drawing conclusions from the classified or coded data
8. Reporting stage (31)

Data collection in the real and natural field began with interviews with participants, and, simultaneously with data collection, analyses will continue and will end with an explanation of women's perceptions and experiences of having an intentional abortion.

To ensure the credibility of the research, four general criteria of Lincoln and Guba (1985) in their approach to trustworthiness, including credibility, dependability, confirmability, and transferability, will be considered during the process of data collation and analysis (36).

To do the integration of findings as the last step of mixed methods studies, the results obtained from both quantitative and qualitative parts will be integrated and the convergent and divergent findings will be discussed and final interpretation will be provided (Table 1).

Table 1. Sensitive and non-sensitive questions in an indirect questionnaire.

Sensitive question	Non-sensitive question
Have you had an Intentional abortion in the past 5 years?	Is the last digit of your national ID number 2, 4 or 6?
Have you had an Intentional abortion in the past 5 years following an unintended pregnancy (by the woman, man, or both)?	Is your blood group 'B'?
Have you been 25 years old or younger at the time of the abortion?	Is your best friend's birthday somewhere between the 1st and 10th day of the month?
Have you been married or single at the time of the abortion?	Have you born in summer?

Discussion

Although abortion is considered against social norms and standard services are not available in Iran, we believe that its rate is still significant (18). This is worrying and should inform policymakers to consider the possibility of enacting new laws. Women need more help and guidance from health care providers to make better decisions about their reproductive lives. In addition, providing adequate resources for reproductive health services is crucial for them (10). Therefore, there is a need to accurately estimate the rate of intentional abortion, as well as to examine its reasons from

the perspective of those who perform it. On the one hand, modernity and up-to-date mass media can change the rate of intentional abortion at any time because people's views on pregnancy and relationships outside the family can constantly change. Most studies conducted in the field of abortion have been conducted quantitatively, and on the other hand, the methods used to estimate the rate of abortion have been direct methods (6, 10). In this regard,

Ghazanfari (2023) study aimed to estimate the prevalence of induced abortion in Tehran using the network augmentation method (NSUM), 2023. The results showed that using the probabilistic method and applying a correction factor related to induced abortion, the annual number of induced abortions was estimated to be 13,300 abortions. The annual voluntary abortion rate in Tehran in 2023 is 5.2 abortions per 1,000 women. Estimating the prevalence of

intentional abortion, especially in population-limited settings, is an important issue for population planning and policymaking. This study recommends that other researchers use alternative indirect methods for estimation in Tehran and conduct similar studies in other cities in the country (33). Sully et al. (2020) conducted a study titled "Estimation of Abortion Incidence Using a Network Upscaling Method". The results showed that the unadjusted NSUM abortion rates were likely to be underestimates (Uganda: 15.3 per 100 births, Ethiopia: 3.6 per 100 births). However, the NSUM abortion rates adjusted for transmission bias significantly overestimated abortions (Uganda: 151.4 per 100 births, Ethiopia: 73.9 per 100 births), likely due to selection bias, question wording, and the use of lifetime abortions to measure transmission bias. Internal validity studies revealed problems with the application of the NSUM in Ethiopia. The researchers reported that the NSUM resulted in overestimating abortion rates in Ethiopia and Uganda (34). The study by Zamanian et al. (2016) used three methods to estimate the prevalence of abortion: direct questioning, network scaling up (NSU), and single sample counting (SSC). The results showed that the annual abortion rate estimated by the direct and NSU methods was 29 (10 intentional, 4 therapeutic, and 15 spontaneous) and 23 (9 intentional, 3 therapeutic, and 11 spontaneous) per 1,000 women aged 18 to 49, respectively. The annual rate of intentional abortion estimated by the SSC method was higher (15 per 1,000 women) than the other methods (10). Since the dominant method used by most studies is NSU, this method also has limitations, so it was decided to conduct the present study using the crosswise method. These disadvantages included the high probability of non-compliance with the instructions of its various models by respondents who either misunderstood the instructions or did not trust the method; increased study costs due to the need for extensive training to increase actual respondent participation; additional burden on respondents due to the mandatory use of a randomization device, which can lead to non-random responses, especially in cases of self-report and finally, the possibility of self-protection bias among both groups of individuals (those who have engaged in sensitive behavior and those who have not).(24) .Haseli et al. (2024) conducted a qualitative study focused on the reasons for unsafe abortion in Iran after pro-birth policy changes. This study included in-depth interviews with 46 women in Kermanshah, Iran. All participants experienced incomplete abortions after undergoing unsafe procedures. Results showed that five main themes emerged from the interviews: economic difficulties, pursuing a prosperous life, unstable marital relationships, health and fertility issues, and cultural factors. Economic challenges, such as unemployment and lack of basic necessities, were the most commonly cited reasons for unsafe abortion. Health issues, including unplanned pregnancies and fear of fetal abnormalities, also played an important role, along with cultural stigmas related to age, illegitimacy, and gender preferences (6). Shahbazi et al. (2012) also conducted a qualitative study regarding consequences of unsafe abortion. In this study, 27 participants were interviewed. Some of the participants were women who had illegal abortions, and others were people who had been in contact with those women. The results showed that four consequences of women's experiences of illegal abortion were identified: physical, psychological, socio-political, and judicial (35). Since these qualitative studies only included interviews and not all interviewees were directly involved in unsafe abortions, it was felt appropriate to conduct a study with a mixed-method design and a high degree of sampling diversity.

The precise estimation of abortion is still a challenge for researchers, both in countries that have legal limitations and in countries where abortion is legal but is mostly performed by unskilled and untrained individuals. Such inaccurate data stems from underreporting in surveys that directly address women's experiences of abortion. Abortion is one of the most sensitive sexual and reproductive behaviors, given its social stigma, privacy concerns, and fear of legal restrictions. Hence, health policy makers and planners require timely and trustworthy data on the incidence of intentional abortion to make informed decisions about the prevention of unintended pregnancy, unsafe abortion, and improvement of women's reproductive health (36-37).

Rnegarding strengths of our study, it is notable that in the first phase of our study, we will determine and compare the rate of intentional abortion, attempted intentional abortion following unintended pregnancies, age (younger or older than 25 years), and marital status at the time of abortion through direct and indirect estimation methods, which is the most important strength of this study. Moreover, it will also investigate the reasons for abortion, its methods, and outcomes through a direct method. In the second phase, the qualitative follow-up of the study will answer all the ambiguities of the first part, which is another strength of this study. After conducting both phases of the study and the representation of all data, in this section, at first, we will discuss and interpret the quantitative and qualitative results, and then we will discuss and interpret the integrated results. Interpreting the integrated results will be a type of meta-inference that will lead us to a deeper insight into the research topic and will help us answer the mixed-methods question of the study and also provide practical solutions to managers and policymakers in the field of women's health. The results of this research can be utilized by researchers, healthcare planners, and executive managers for future research and for implementing necessary changes in health programs to reduce the number of illegal abortions and complications of illegal, unsafe abortions.

Our study has some limitations. Due to the nature of the sampling environment (health centers in southern Tehran, under the auspices of Tehran University of Medical Sciences), never-married individuals will not be included in this study, which could affect the estimated abortion rate. Also, due to the type of study design and the relevant questionnaires, it will not be possible to compare all demographic characteristics (except age, current marital status, women's education, women's occupation, and household income adequacy) between the two groups of women with and without intentional abortion in the direct estimation group. However, because this study provides a broad estimate of abortions, the results of this study can be used to design and implement health programs for all people with unsafe abortions.

Declerations

Acknowledgments

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Conflicts of interest

The authors declared no conflicts of interest.

Ethical considerations

Written informed consent will be obtained from each participant. Also, at the beginning of the study, the method and objectives will be explained to the individuals. All participants will be informed that the interviews will be recorded without mentioning their names and will have a code. The recorded files will be kept with the researcher for six months after the completion of the work stages and the delivery of the final report of the study, and then they will be deleted. Individuals who do not consent to the recording of the sessions will be written off by two researchers.

Code of Ethics

This protocol has been approved by the Ethics Committee of the Tehran University of Medical Sciences, Tehran, Iran (ethical code: IR.TUMS.FNM.REC.1401.215).

Use of Artificial Intelligence (AI)

We have not used any AI tools or technologies to prepare this manuscript.

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Authors' contribution

ZMT, SK and SSS were involved in designing the protocol. MY and MS are responsible for the implementation and analysis plan. ZMT and RH prepared the initial draft of this protocol study. All authors have carefully reviewed the manuscripts, provided input, made revisions, and collectively approved the final manuscript.

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