

LITERATURE REVIEW ANALYSIS OF FACTORS THAT CAUSE ABORTION IN PREGNANT WOMEN

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ABSTRACT

Abortion remains one of the major maternal health issues that can increase maternal morbidity and mortality. Its occurrence is influenced by various factors related to the mother, the fetus, or the environment. This study analyzed the causes of abortion in pregnant women based on published research findings. A literature review was conducted by examining scientific articles retrieved from electronic databases according to predefined inclusion and exclusion criteria. The data were analyzed descriptively to identify factors associated with abortion. The results identified key contributing factors: maternal age (≤ 20 years or ≥ 35 years), parity, prior history of abortion, anemia, comorbid conditions, infections, poor nutritional status, and inadequate prenatal care (ANC). Fetal chromosomal abnormalities also represent a significant cause of abortion. The occurrence of miscarriage is influenced by various maternal and fetal factors, with maternal age, history of miscarriage, and maternal health status being the most dominant determinants. Early identification of risk factors and improvement in the quality of prenatal care are essential to reduce the incidence of miscarriage.

Keywords: Abortion, Pregnant women, Risk factors, Literature review

INTRODUCTION

Pregnancy at a young age carries its own complexities, both in terms of biological and psychological preparedness. One of the most common obstetric complications and a major challenge in maternal health care is spontaneous abortion. Spontaneous abortion not only has a profound psychological impact on the mother but also contributes to global maternal morbidity. In Indonesia, the mortality rate and pregnancy-related complications still require serious attention through strengthened management and a comprehensive understanding of risk factors. Although various clinical and non-clinical factors can theoretically trigger unintentional pregnancy termination, the characteristics of specific risk factors in the young pregnant population have not been fully and consistently mapped. Several previous studies have linked abortion incidence to anthropometric factors such as Body Mass Index (BMI), immunological factors, and exposure to reproductive tract infections that disrupt the intrauterine environment. In addition to biological factors, psychosocial dimensions such as smoking behavior and vulnerability to domestic violence or Intimate Partner Violence (IPV) are also strongly suspected to be closely correlated with the multiplicity of risks in young pregnancy. However, the variability in findings

between studies and differences in the indicators examined often lead to bias and uncertainty in determining which factors are most dominant. For example, the debate regarding the significance of micronutrient status, such as iodine levels, and the influence of early sexual history, still requires further examination.

through structured data synthesis. Therefore, an in-depth and systematic study is needed to integrate the various scientific evidence available. This systematic review aims to comprehensively identify various risk factors for spontaneous abortion in young pregnancies. The results of this study are expected to provide a strong theoretical foundation for health workers, particularly in early detection and prevention efforts, as well as improving the quality of obstetric and gynecological care for adolescents and young women

RESERCH METHOD

This study used a literature review method to identify and analyze factors that cause abortion in pregnant women. Data were obtained through a search of published scientific articles from various electronic databases, such as Google Scholar, PubMed, and ScienceDirect. The article selection process involved several stages: identification, screening, eligibility assessment, and determining which articles met the criteria. Articles that were irrelevant, duplicate, or lacked data relevant to the research objectives were excluded from the review.

The obtained data were then extracted and analyzed descriptively to identify factors most frequently associated with abortion, such as maternal age, parity, history of abortion, comorbidities, nutritional status, genetic factors, infections, and environmental and lifestyle factors. The results of the analysis are presented in narrative and tabular form to provide a comprehensive overview of the factors causing abortion in pregnant wom

he following is a summary of the 16 articles that were successfully collected and reviewed, including the research design, the presence or absence of interventions, and the main findings of each. This study uses the Literature Review method to identify and analyze the factors that cause abortion in pregnant women. Data was obtained through searching published scientific articles from various databases electronic devices, such as Google Scholar, PubMed, and ScienceDirect. The article selection process is carried out through several stages, namely identification, screening, eligibility assessment, and determination of articles that meet the criteria. Articles that are irrelevant, duplicate, or do not have data that match the research objectives are excluded from the study.

The data obtained were then extracted and analyzed descriptively to identify the factors most often associated with the incidence of abortion, such as maternal age, parity, history of abortion, comorbidities, nutritional status, genetic factors, infections, and environmental and lifestyle factors. The results of the analysis are presented in the form of narratives and tables to provide a comprehensive picture of the factors that cause abortion in pregnant women

RESEARCH RESULT

The following is a summary of the 16 articles that were successfully collected and reviewed, including the research design, the presence or absence of interventions, and the main findings of each.

No	Author/Year	Title	Design and Samples	Intervention	Results
1	(Yulianti et al. 2025)	Analysis of Factors Related to the Incidence of Abortion in Mothers at the Makassar Mother and Child Motherhood Hospital	Observational analytical research with a cross-sectional approach. The population was 117 pregnant women, a sample of 54 respondents used purposive sampling. Data is obtained from medical records.	Independent variables: parity, anemia, and history of abortion. Dependent variable: abortion incidence. Analysis using Chi-Square test and logistic regression.	Parity was not related to the incidence of abortion ($p=0.617$). Anemia was associated with the incidence of abortion ($p=0.010$). History of abortion is related to the incidence of abortion ($p=0.021$). The most dominant factor was anemia with $\text{Exp}(B)=4.197$, followed .
2	Neni Riyanti, Risa Devita, Dwi Wahyuni 2021	Analysis of Factors Related to Pregnancy Risk in Pregnant Women	Descriptive quantitative research with a retrospective approach. Population of 318 pregnant women at BPM Mitra Mulya Banyuasin in 2019. Sample of 177 respondents Using random sampling.	Variable dependen: Pregnancy Risk. Independent variables: age, parity, gestational distance, and nutritional status (LILA). Analysis using the Pearson Product Moment test.	There is a meaningful connection between age with pregnancy risk in pregnant women with $p\text{-value} = 0.000$ and correlation coefficient $r = 0.307$ (weak positive correlation). Pregnant women aged <20 years and >35 years have a higher risk of pregnancy than those aged 20–35 years.
3	(Sitanggang et al. 2022)	Analysis of Factors	Mixed Methods	Independent variables: age,	Age had no effect on the incidence of abortion

		Affecting the Incidence of Abortion at Cut Meutia Langsa Hospital, Aceh Province	Research with Explanatory Sequential design. A quantitative sample of 54 pregnant women who had an abortion out of 119 population uses the Slovin formula. The qualitative sample consisted of 5 mothers who had had an abortion and 2 midwives.	education, parity, abortion history, and nutritional status. Dependent variable: abortion incidence. Quantitative analysis using the Chi-Square test and continued multivariate analysis.	($p=0.951$). Education had no effect ($p=0.183$). Parity had a significant effect ($p=0.000$), history of abortion had a significant effect ($p=0.013$), and nutritional Significant Effect Status ($p=0.000$). The most dominant factor influencing abortion was parity with an OR value = 31.495.
4	Rochany Septiyaningsih & Frisca Dewi Yunadi 2021(Mujayanah and Putri 2025)	Analysis of Factors Influencing the Incidence of Anemia in Pregnancy	Analytical research with a cross-sectional approach. A sample of 60 pregnant women in the third trimester used accidental sampling technique in the Working Area of the South Cilacap Health Center I.	Independent variables: maternal age, parity, knowledge, nutritional status, and adherence to taking Fe tablets. Dependent variables: incidence of anemia in pregnant women. The analysis uses Chi-Square and Logistic Regression.	Terdapat hubungan yang signifikan antara umur ibu ($p=0,000$), paritas ($p=0,011$), pengetahuan ($p=0,020$), status gizi ($p=0,021$), dan kepatuhan mengonsumsi tablet Fe ($p=0,040$) dengan kejadian anemia pada ibu hamil. Faktor yang paling berpengaruh adalah status gizi dengan $p=0,025$ dan OR=6,896.
5	(Mujayanah and Putri 2025)	Analysis of Pregnancy Complication Factors in	Quantitative analytical survey research with	There was a significant relationship between	There is a significant relationship between pregnancy complications and the incidence of

		Primigravida Pregnant Women with Anemia at Serongga Health Center in 2023	a Case Control approach. The sample consisted of 57 respondents (19 cases and 38 controls) who were selected by random sampling. Independent variable: anemia in Pregnant women primigravida. Variabel independen: pregnancy complication s. Data were obtained from the KIA/VK register book and analyzed using the Chi-Square test.	pregnancy complications and the incidence of anemia in primigravida pregnant women with a p value = 0.021 (< 0.05). Of the 19 pregnant women who experienced complications, 12 people have anemia, while from 38 mother Pregnant without complications, 11 people developed anemia.	anemia in primigravida pregnant women
6	Lia Yuliani, Atikah Adyas, Dewi Rahayu 2023	Factors Related to the Incidence of Abortion Quantitative research with case control design	A sample of 141 respondents was selected using purposive sampling at Ragab Begawe Caram Hospital, Mesuji Regency.	The variables studied included maternal age, parity, anemia, and nutritional status to the incidence of abortion. Data were collected through observation of medical records and analyzed using Chi-Square tests and Multiple	There was a significant relationship between maternal age (p=0.021; OR=2.506), parity (p=0.008; OR=3.074), anemia (p=0.006; OR=2.958), and nutritional status (p=0.001; OR=5.039) with the incidence of abortion. The most dominant factor was nutritional status with OR=6.613 and p=0.000.

				Logistic Regression.	
7	Wiwik Anggraini, Ahmad Arif, Selly Septina 2025	Distribution of Risk Factors for Abortion in Pregnant Women at YARSI Hospital in 2023 Analytical observational research with cross sectional design. The sample was 105 pregnant women from a population of 1,847 mothers pregnant, using purposive sampling techniques.	The variables studied were maternal age, parity, and abortion history against abortion incidents.	Data were obtained from medical records and analyzed by univariate analysis, bivariat, dan multivariat.	The results showed that 69 respondents (65.7%) had an abortion, 60 respondents (57.1%) had a risk age, 60 respondents (57,1%) multipara, dan 56 Respondents (53.3%) had a history of abortion. There was a significant relationship between age ($p=0.000$), parity ($p=0.008$), and abortion history ($p=0.000$) with abortion incidence. The most dominant factor was the age of the mother with OR = 8,500.
8	Diaz Syahidah Marwah, Keisha Najmina Zata, Muhamad Naufal, Muhammad Imam Fadhillah, dan Nayla Kamilia Fithris. 2023	Analysis of Factors Related to Pregnant Women's Stress Level and Its Implications on Fetal Health.	This study collects, analyzes, and synthesizes data from 9 scientific articles (2018–2023 range)	obtained through Google Scholar, Garuda, and ScienceDirect databases	Younger pregnant women tend to experience stress due to a lack of readiness, attention, and experience in accepting their pregnancy. * Economic Difficulties: Pregnant women from lower-middle economic families are prone to experiencing anxiety and stress due to thinking about childbirth costs and hospitals. * Employment Status: Women who work while taking care of the household bear the burden of dual activities. Lack of sleep due to a nighttime work schedule also increases stress levels.

9	Sri Purwanti, Nasrawati, dan Sri Rahayu. 2024	Incident Analysis Abortion in Pregnant Women Against Sexual Frequency at Kardinah Tegal Hospital.	Research using desain case control. A total of 112 pregnant women, consisting of pregnant women who had an abortion (case) and did not have an abortion (control) with a 1:1 ratio (56 cases: 56 controls).	This research is a Research observational (not experimental), so that no intervention is given to the subject. Data collection was carried out using an instrument in the form of a secondary data filling sheet	* There is a significant relationship between sexual frequency with the occurrence of abortion in pregnant women at Kardinah Tegal Hospital ($X^2 = 28.679$; $p\text{-value} = 0.000$). * Pregnant women with sexual frequency in the risk category have an 11.96 times greater chance of having an abortion compared to mothers whose sexual frequency is not ($\text{OR} = 11.96$; $95\%\text{CI} = 4.397 - 32.509$).
10	Rizky Ananda dan Hanifah 2026	The Relationship between Age and the Incidence of Abortion in Pregnant Women at Banten Hospital	Analytical survey using the Cross Sectional approach Based on the journal text, this article was published in MaternalCare Indonesia Journal, Volume 1, Number 1, Year 2026 by the Bina Husada Serang Health Institute with an Open Access (CC BY) license.	This study was observational (non-experimental), so it did not provide clinical intervention directly to the respondents. However, as a form of Follow-up plans/educational interventions in the future, it is recommended for health workers to provide and improve education using video media (video shows) or posters about pathologies in pregnancy.	Of the 248 respondents, 72 (29%) and 176 (71%) who did not have an abortion had an abortion. The group of mothers with a risk age (<20 or >35 years) who had an abortion was 31 respondents (41.9%). Meanwhile, the group of mothers with non-risk ages (20-35 years) who had an abortion was 41 respondents (23.6%). Test results Bivariate statistics show that the $p\text{-value} = 0.006 < 0.05$, which means that there is a significant relationship between the mother's age and the incidence of abortion in pregnant women at Banten Hospital.
11	Asniar, Dewi	Analysis Of Factors Affecting	This study used a cross-sectional	No clinical interventions were provided	History of Abortion: There was a meaningful association with the

	Setiawati, Trisnawaty. 2022	Abortion Incidence	design with a case-control research design. The total sample was 120 people, consisting of 60 case samples (pregnant women who had an abortion and met the inclusion and exclusion criteria) and 60 control samples (pregnant women who did not have an abortion in a 1:1 ratio). Case sampling technique using total sampling dari data rekam medik.	(such as medication or therapy) as the study was observational and analytical using secondary data from medical records. The analysis steps carried out were to conduct statistical tests, univariate analysis and bivariate analysis using the Pearson Chi-square to look at the relationship of variables (maternal age, parity, history of abortion, anemia, and occupation) with abortion incidence	incidence of abortion ($p = 0.009$, $OR = 2.970$). Mothers who have had abortions before are at higher risk.
12	Eick et al. (2022)	Prenatal PFAS and psychosocial stress exposures in relation to fetal growth in two pregnancy cohorts: Applying environmental mixture methods to chemical and non-chemical stressors	Cohort Study ECHO.CA.IL COHORT Sample: Two pregnancy cohorts	Analyze the co-effects between exposure to per- and poly-fluoroalkyl chemicals (PFAS), perceived stress, and depression on fetal growth.	Prenatal PFAS exposure is associated with decreased fetal growth, while psychosocial stress is associated with an increased risk of stunted fetal growth.

13	Yenni Vernandasari Purba 2023	The Relationship between the Age of Pregnant Women in the 1st Trimester and the Incidence of Spontaneous Abortion at the Adam Malik Hajj Center General Hospital in Medan in 2023	Design: Analytical research with a case-control approach. Samples: A total of 30 samples were taken using the total technique sampling of the entire population of pregnant women who gave birth in the VK room.	There was no intervention (not experimental research). This study was observational to analyze the relationship of variables using univariate and bivariate analysis with Chi-square test.	Of the group of cases that experienced spontaneous abortion, there were 27 subjects (90%) who were at an early age (< 20 years) and 3 respondents (10%) who were at the age of > 20–35 years. * The test conclusions show a relationship between Age of pregnant women in the 1st trimester with events Of the group of cases that experienced spontaneous abortion, there were 27 subjects (90%) who were at an early age (< 20 years) and 3 respondents (10%) who were at the age of > 20–35 years. * The conclusion of the test showed that there was a relationship between the age of the 1st trimester pregnant woman and the occurrence Mothers with risk age (>40 years) and risk parity (≤ 0 or >2) are more susceptible to ovarian cancer. However, the results of the Chi-Square test showed a p-value of 0.124, which means there was no significant relationship between parity and the incidence of ovarian cancer
14	Jelita Lahagu 2023	The Relationship between Age and Parity with the Incidence of Ovarian Cancer in Women of Childbearing	Cross Sectional design with a sample of 79 women of childbearing age (Simple Random	There were no clinical interventions (observational studies). The methods used were the collection of	Mothers with risk age (>40 years) and risk parity (≤ 0 or >2) are more susceptible to ovarian cancer. However, the results of the Chi-Square test showed a p-value of 0.124, which

		Age at H. Adam Malik Hospital Medan in 2023	Sampling). White cover with faceted logo five blue-gold STIKes Mitra Husada Medan.	respondent characteristics data and statistical analysis of the Chi-Square test.	means there was no significant relationship between parity and the incidence of ovarian cancer
15	Darmayati, dkk. 2026	Risk Factors for Anemia in Pregnant Women at PMB Desi S Sembiring, Deli Serdang Regency, North Sumatra Province in 2025.	Analytical cross-sectional design. Published in the VII FORISMA Proceedings of STIKes Mitra Husada Medan.	Observational studies (no direct treatment). The examination uses a digital hemoglobinometer and medical records. Recommended interventions in the form of nutritional counseling and monitoring consumption of Fe tablets.	As many as 46.9% of pregnant women experience anemia. A significant relationship was found between maternal age ($p=0.015$), parity/number of children ($p=0.004$), and gestational age ($p=0.010$) with the incidence of anemia. The most vulnerable groups were extreme age (<20 or >35 years), parity ≥ 3 , and trimesters I and II.
16	Nurhanisa, dkk. 2021	Factors Related to the Occurrence of Abortion	Kuantitatif, Survey Analitik, pendekatan cross-sectional Sampul (Jurnal): Jurnal Aisyiyah Medika	There were no interventions (observational studies). The steps taken were random sampling on 83 pregnant women and a statistical test chi-square.	Factors significantly related to abortion were maternal age ($p = 0.020$) and maternal activity/work ($p = 0.014$). Meanwhile, maternal parity ($p = 0.057$) was not significantly related.
17.	(WHO 2025)	WHO guideline on preventing early pregnancy and poor reproductive outcomes among adolescents in low- and middle-income countries. Web	Systematic reviews, meta-analyses, and GRADE evidence syntheses of randomized controlled trials (RCTs), quasi-experimental,	Prevention of child marriage, keeping girls in school, comprehensive sexuality education, improving access to contraceptive information and services, youth-	Overall, the evidence showed that these interventions contributed to delaying early marriage, reducing adolescent pregnancy, increasing contraceptive use, improving reproductive health knowledge and service utilization, and promoting healthier reproductive

		Annex. Evidence base	cohort, case-control, and qualitative studies involving adolescents aged 10–19 years (primarily girls) in low- and middle-income countries (LMICs). Sample sizes varied across the included studies, ranging from hundreds of participants to nationally representative surveys involving tens of thousands of adolescents.	friendly sexual and reproductive health services, prevention of sexual coercion and gender-based violence, cash transfer programmes, community mobilization, and improved maternal health care for pregnant adolescents.	outcomes. The certainty of evidence ranged from very low to high depending on the intervention and outcome.
18.	(Mujayanah and Putri 2025)	Analysis of Anxiety Factors of Pregnant Women on Sexual Relations in Tambelang Health Center, Bekasi District, 2023	A quantitative observational study with a cross-sectional design was conducted among 130 pregnant women attending Tambelang Health Center, Bekasi District, Indonesia. Participants were selected	No intervention was implemented. This was an observational study in which researchers collected data using a structured questionnaire, including the Hamilton Anxiety Rating Scale (HARS) to assess anxiety and a questionnaire measuring	The study found that maternal age ($p = 0.012$), gestational age ($p < 0.001$), history of abortion ($p = 0.001$), and knowledge about sexual intercourse during pregnancy ($p < 0.001$) were significantly associated with anxiety regarding sexual intercourse during pregnancy. In contrast, parity ($p = 0.386$), educational level ($p = 0.386$), and employment status ($p = 0.367$) were not significantly associated with anxiety. The findings

			using accidental (convenience) sampling and included pregnant women who met the inclusion criteria and agreed to participate in the study	knowledge about sexual intercourse during pregnancy.	suggest that increasing pregnant women's knowledge through education and counseling may help reduce anxiety related to sexual activity during pregnancy.
19.	(Motaweih et al. 2025)	A Rare Cause of an Acute Myocardial Infarction in a Young Pregnant Woman After Misoprostol-Induced Abortion	A case report describing one 34-year-old pregnant woman who developed an acute myocardial infarction (AMI) after receiving misoprostol for medical abortion due to fetal death.	The patient received misoprostol for induction of abortion. After developing severe chest pain, she underwent electrocardiography (ECG), coronary angiography, and was treated with intracoronary nitroglycerin, which relieved the coronary artery spasm, followed by standard medical management for acute myocardial infarction.	Coronary angiography demonstrated severe coronary artery spasm without significant atherosclerotic coronary artery disease. Administration of intracoronary nitroglycerin completely resolved the vasospasm, confirming misoprostol-induced coronary vasospasm as the cause of the acute myocardial infarction. The patient recovered successfully with appropriate treatment. The authors concluded that although rare, misoprostol can induce coronary vasospasm leading to acute myocardial infarction, and clinicians should consider this diagnosis in patients presenting with chest pain after misoprostol administration.
20.	(Arshadi et al. 2025)	Non-genetic risk factors of miscarriage: a comprehensive	Umbrella review of published systematic	No intervention was applied because this was an observational	Of the 227 evaluated associations, none met the criteria for strong evidence. Forty-five

		umbrella review of systematic review and meta-analysis	reviews and meta-analyses. The authors searched Scopus, PubMed, Embase, and Web of Science up to October 2025. They included 29 systematic reviews and 147 meta-analyses (227 meta-analysis components) investigating non-genetic risk factors for miscarriage based on observational studies. Review quality was assessed using the AMSTAR tool.	evidence synthesis. The review examined non-genetic exposures associated with miscarriage, including medical conditions, environmental and occupational exposures, infections, medications, behavioral and emotional factors, nutritional factors, biomarkers, menstrual factors, trace elements, and platelet indices	factors were supported by suggestive evidence, while the remaining associations showed weak or insufficient evidence. The most consistently associated factors were hypothyroidism (pooled effect size ≈ 2.01 , 95% CI 1.66–2.44), high serum β -human chorionic gonadotropin (β -hCG) (≈ 2.88 , 95% CI 1.76–4.68), and hairdressing occupation (≈ 1.28 , 95% CI 1.11–1.47). However, because the 95% prediction intervals included the null value, none of these associations were considered conclusive.
21.	(Liang et al. 2024)	Global, regional, and national burden of preterm birth, 1990–2021: a systematic analysis from the global burden of disease study 2021	Umbrella review of published systematic reviews and meta-analyses. The authors searched Scopus, PubMed, Embase, and Web of Science up to October 2025. They included 29	No intervention was applied because this was an observational evidence synthesis. The review examined non-genetic exposures associated with miscarriage, including medical conditions, environmental	Finally, 147 meta-analyses and 29 systematic review studies remained. None of the factors met all the necessary criteria and showed a definite association. However, 45 factors were classified as associations supported by suggestive evidence. Among these 45 factors—three factors—hypothyroidism, high serum β -human chorionic gonadotropin, and

			systematic reviews and 147 meta-analyses (227 meta-analysis components) investigating non-genetic risk factors for miscarriage based on observational studies. Review quality was assessed using the AMSTAR tool	and occupational exposures, infections, medications, behavioral and emotional factors, nutritional factors, biomarkers, menstrual factors, trace elements, and platelet indices.	hairdressers—including the most complete information (they had more than 1,000 cases, significant based on the random-effects model, $p < 0.001$, respectively; (2/01(1/66–2/44), 2/88(1/76–4/68), 1/28(1/11–1/47)).\
22.	(Podilyakina et al. 2025)	Risk factors for first-trimester spontaneous abortion and the role of preconception care	This study employed a retrospective observational cohort design using medical records from 1,526 pregnant women. Participants were divided into two groups based on pregnancy outcomes: women who experienced first-trimester spontaneous abortion and women who had live births. Bivariate and multivariable logistic	No experimental intervention was conducted because this was an observational study. The researchers evaluated the association between preconception care and the risk of first-trimester spontaneous abortion. Other variables examined included maternal age, body mass index (BMI), previous miscarriage, diabetes, hypertension, and	The multivariable analysis showed that maternal age over 35 years (OR = 2.02; 95% CI: 1.49–2.75), obesity (OR = 1.81; 95% CI: 1.12–2.91), and a history of previous spontaneous abortion (OR = 1.57; 95% CI: 1.01–2.43) were significant risk factors for first-trimester spontaneous abortion. In contrast, women who received preconception care had a 42% lower risk of spontaneous abortion (OR = 0.58; 95% CI: 0.45–0.75). The authors concluded that preconception care may play an important protective role in reducing the risk of early pregnancy loss, although prospective studies are needed to confirm a causal relationship.

			regression analyses were performed to identify independent risk factors associated with spontaneous abortion.	demographic characteristics.	
23.		Relationship between exposure to air pollutants in the first trimester and spontaneous abortion in pregnant women in the river valley city	This study employed a retrospective matched case-control design. Data were collected from two tertiary hospitals in a river valley city in Northwest China. The study included 293 women who experienced first-trimester spontaneous abortion (case group) and 1,172 women with full-term pregnancies (control group), matched by maternal age at a 1:4 ratio. Maternal exposure to ambient air pollutants during the	This study employed a retrospective matched case-control design. Data were collected from two tertiary hospitals in a river valley city in Northwest China. The study included 293 women who experienced first-trimester spontaneous abortion (case group) and 1,172 women with full-term pregnancies (control group), matched by maternal age at a 1:4 ratio. Maternal exposure to ambient air pollutants during the first trimester was estimated using environmental monitoring data.	This study employed a retrospective matched case-control design. Data were collected from two tertiary hospitals in a river valley city in Northwest China. The study included 293 women who experienced first-trimester spontaneous abortion (case group) and 1,172 women with full-term pregnancies (control group), matched by maternal age at a 1:4 ratio. Maternal exposure to ambient air pollutants during the first trimester was estimated using environmental monitoring data.

			first trimester was estimated using environmental monitoring data.		
24.	(Brittain et al. 2023)	Prior Spontaneous or Induced Abortion Is a Risk Factor for Cervical Dysfunction in Pregnant Women: A Systematic Review and Meta-analysis <i>Reproductive Sciences</i> (2023)	This study was a systematic review and meta-analysis conducted according to the PRISMA guidelines. The authors systematically searched PubMed, Embase, Web of Science, and the Cochrane Library for eligible studies published up to September 2022. A total of 15 observational studies involving more than 2.5 million pregnant women were included in the meta-analysis. The included studies consisted of cohort and case-control designs evaluating	No intervention was performed because this was a systematic review and meta-analysis. The exposure of interest was a history of spontaneous abortion or induced abortion, while the primary outcome was cervical dysfunction, including cervical insufficiency and short cervix, during subsequent pregnancies.	The meta-analysis demonstrated that both prior spontaneous abortion and induced abortion were significantly associated with an increased risk of cervical dysfunction in subsequent pregnancies. Women with a history of abortion had a significantly higher likelihood of developing cervical insufficiency compared with women without such a history. The risk increased with multiple previous abortions, indicating a dose-response relationship. The authors concluded that a history of abortion should be considered an important risk factor when assessing cervical health and pregnancy outcomes, and women with previous abortions may benefit from closer cervical surveillance during pregnancy.

			the association between previous spontaneous or induced abortion and cervical dysfunction in subsequent pregnancies.		
25.	(Brittain et al. 2023)	<i>Risk Factors Associated with Spontaneous Abortion at Dr. Soetomo Hospital in 2019–2023.</i>	This study used a cross-sectional analytic design. The study population consisted of pregnant women who attended Dr. Soetomo Hospital between 2019 and 2023, including women with and without spontaneous abortion. A total of 110 participants were included, comprising 55 women with spontaneous abortion (case group) and 55 women without spontaneous abortion (control	No intervention was administered because this was an observational study. The researchers analyzed the association between several maternal risk factors—maternal age, parity, pregnancy interval, body mass index (BMI), and hemoglobin level—and the occurrence of spontaneous abortion. Data were analyzed using Chi-square tests and multivariate logistic regression with SPSS software.	Maternal age ($p = 0.003$), pregnancy interval ($p = 0.005$), and hemoglobin level ($p = 0.005$) were significantly associated with spontaneous abortion. Parity ($p = 0.070$) and BMI ($p = 0.525$) were not significantly associated. The most dominant risk factor was maternal age <20 years or >35 years, with an odds ratio (OR) of 6.769. The authors concluded that advanced or very young maternal age, short pregnancy interval, and low hemoglobin levels are significant predictors of spontaneous abortion.

			group). Data were obtained retrospectively from medical records.		
		<i>Determinants of induced abortion among women received maternal health care services in public hospitals of Arba Minch and Wolayita Sodo town, southern Ethiopia: unmatched case-control study</i>	Observational analytic study with an unmatched case-control design. The study included 412 women (103 cases and 309 controls) who received maternal health services in selected public hospitals in Southern Ethiopia from April to June 2021. Data were collected through structured face-to-face interviews and analyzed using logistic regression.	The researchers analyzed factors associated with induced abortion, including residence, age at first sexual intercourse, number of sexual partners, number of living children, contraceptive knowledge, education, and income.	Urban residence was associated with a higher risk of induced abortion (AOR = 2.33; 95% CI: 1.26–4.32). Women whose first sexual intercourse occurred at 20–24 years had a lower risk of induced abortion (AOR = 0.51; 95% CI: 0.27–0.97). Multiple sexual partners were the strongest determinant, increasing the risk more than fivefold (AOR = 5.47; 95% CI: 2.98–10.03). Having one living child (AOR = 0.32; 95% CI: 0.10–0.99) and good knowledge of contraceptives (AOR = 0.12; 95% CI: 0.03–0.46) were protective factors against induced abortion.
	(Lokubal et al. 2022)	<i>Abortion decision-making process trajectories and determinants in low- and middle-income countries: A mixed-methods systematic</i>	This study used a mixed-methods systematic review and meta-analysis. The researchers reviewed	No intervention was administered because this was a systematic review and meta-analysis. The researchers synthesized evidence	The review found that financial barriers, restrictive abortion laws, stigma, lack of access to safe abortion services, partner influence, and family pressure were the major determinants affecting abortion decision-making.

		<i>review and meta-analysis</i>	studies published between 2000 and 2021 that examined abortion decision-making among women in low- and middle-income countries (LMICs). A total of 79 studies met the inclusion criteria, comprising quantitative, qualitative, and mixed-methods studies.	regarding factors influencing abortion decision-making, including women's autonomy, partner and family involvement, financial constraints, access to health services, legal restrictions, and sociocultural norms.	Women's autonomy and access to accurate reproductive health information increased the likelihood of timely and safe abortion care. Delays in decision-making were commonly associated with social stigma, limited financial resources, and legal restrictions, which increased the risk of unsafe abortion.
	(Strumpf et al. 2021)	<i>Prevalence and Clinical, Social, and Health Care Predictors of Miscarriage</i>	This study used a population-based cohort design. Linked administrative health data from Manitoba, Canada were analyzed to estimate miscarriage prevalence and identify predictors between 2003 and 2014. The final study population	No intervention was administered because this was an observational cohort study. The researchers examined several predictors of miscarriage, including maternal age, infertility drug use, chronic diseases, mental health history, socioeconomic status, obesity, smoking, previous health care utilization,	The estimated average annual miscarriage prevalence was 11.3%. The strongest clinical predictor was use of infertility drugs, which increased the risk of miscarriage by approximately 4 percentage points. A history of suicide attempt was also associated with an increased risk of miscarriage. Other factors associated with miscarriage included advanced maternal age, obesity, smoking, diabetes, hypertension, and mental health conditions. The study concluded that both

			consisted of 79,978 women with identified pregnancies. Multivariable generalized linear models were used to evaluate the association between clinical, social, and health care factors and the first detected miscarriage.	and prenatal care.	clinical and social factors contribute to the risk of miscarriage and should be considered in strategies for prevention and maternal health care.
	(Strumpf et al. 2021)	<i>Adverse Childhood Experiences are Associated with Miscarriage in Adulthood: The GROWH Study</i>	This study used an observational cross-sectional design based on data from the GROWH (Global Research on Women's Health) Study. The study included 645 women aged 18–45 years in the United States. Data were collected using structured questionnaires on reproductive history and adverse childhood	No intervention was administered because this was an observational study. The independent variable was adverse childhood experiences (ACEs), including childhood abuse, neglect, and household dysfunction. The dependent variable was the history of miscarriage. Statistical analysis was conducted using multivariable logistic regression while adjusting for sociodemograph	Women with higher ACE scores had significantly greater odds of experiencing miscarriage than women with no ACEs. Exposure to multiple adverse childhood experiences was independently associated with miscarriage after adjustment for potential confounders. The study concluded that childhood adversity may have long-term effects on women's reproductive health, emphasizing the importance of trauma-informed reproductive and maternal health care.

			experiences (ACEs). Multivariable logistic regression analysis was performed to determine the association between ACEs and miscarriage.	hic and reproductive characteristics.	
	(Strumpf et al. 2021)	<i>Exposure to Perfluoroalkyl Substances in Early Pregnancy and Risk of Sporadic First Trimester Miscarriage</i>	This study used a prospective cohort design based on the Swedish SELMA pregnancy cohort. The study included 78 women with sporadic first-trimester miscarriage (cases) and 1,449 women with live births (controls). Maternal serum samples collected during the first trimester were analyzed to measure concentrations of eight perfluoroalkyl substances (PFASs). Logistic regression	No intervention was administered because this was an observational cohort study. The independent variables were serum concentrations of perfluoroalkyl substances (PFASs), particularly perfluorooctanoic acid (PFOA) and other PFAS compounds. The dependent variable was sporadic first-trimester miscarriage. Statistical analyses were adjusted for maternal age, parity, and smoking status.	Higher maternal exposure to PFOA during early pregnancy was significantly associated with an increased risk of sporadic first-trimester miscarriage (OR = 1.48; 95% CI: 1.09–2.01 for each doubling of PFOA concentration). A dose-response relationship was observed across PFOA exposure quartiles. PFNA showed a similar trend but did not reach statistical significance, while the other PFAS compounds were not significantly associated with miscarriage. The findings suggest that PFOA exposure in early pregnancy is an environmental risk factor for miscarriage.

			analysis was used to determine the association between PFAS exposure and miscarriage risk		
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DISCUSSION

Abortion is defined as the threat or expulsion of the results of conception before the fetus can live outside the womb, which is characterized by a gestational age of less than 20 weeks or the weight of the fetus less than or equal to 500 grams. Based on the results of a synthesis of literature from several Recent clinical studies, the incidence of abortion is

influenced by multi-factor interactions .which is complex, including maternal physiological aspects, reproductive history, and intimate behavior during pregnancy. Broadly speaking, the risk factors that cause abortion can be classified into maternal factors (maternal conditions), fetal factors (fetal), and external factors.1. Anemia Factors in Pregnancy (Widiastuti et al., 2025; Yulianti et al., 2025)

Anemonea It is one of the most common pregnancy complications found in the first trimester and is closely related to an increased risk of abortion. A decrease in hemoglobin (Hb) levels in pregnant women to below 11 gr% (or extreme conditions less than 7 gr%)inhibit the circulation process and transport of nutrients and essential oxygen supply to the placenta. This disruption of the supply of oxygen and nutrients in turn triggers growth abnormalities in the result of conception or even death of the fetus, thus triggering the body's reaction to release the results of conception (spontaneous abortion). The statistical analysis presented by Yulianti et al. (2025) significantly proves this cause-and-effect relationship ($p = 0.010$), where anemia appears as the strongest determining factor with the value of the Odds Ratio or The power of influence reaches $\text{Exp}(B) = 4.197$. In line with this, a study by Widiastuti et al. (2025) also confirmed the existence of a strong linear relationship between anemia status in primigravida pregnant women and the onset of pregnancy complications such as abortion ($p = 0.021$).

(Etna Kartika Sari et al. 2025)(Etna Kartika Sari et al. 2025)

2. Previous Abortion History (Yulianti et al., 2025)

A mother's reproductive record in the past is an important predictor of the safety of the next pregnancy. Based on the findings of Yulianti et al. (2025), there is a very real statistical relationship between previous abortion history and the risk of recurrent abortion with a significance value of $p = 0.021$. Through multivariate regression analysis, mothers who had history of miscarriage has a 3.194-fold higher risk of having a re-miscarriage ($\text{Exp}(B) = 3.194$).

Clinically, couples who try to get pregnant again after a miscarriage have an increased probability of experiencing similar events as a history of previous abortions accumulates (about 5% of couples have had 2 consecutive miscarriages, and 10% have 3 or more consecutive miscarriages). This condition is generally associated with not having recovery or abnormalities in the function of the uterine wall and the mother's reproductive organs. (Sinaga et al. 2024)

3. Risky Sexual Frequency (Purwanti et al., 2024)

Sexual activity is basically allowed during pregnancy as long as the pregnancy is under normal conditions and is done with care. However, the frequency of uncontrolled or risky sexual intercourse at the beginning of pregnancy is potentially triggers abortion. Research conducted by Purwanti et al. (2024) at Kardinah Tegal Hospital revealed a very significant relationship between the frequency of risky sexual activity and the incidence of abortion ($p = 0.000$). Data shows that pregnant women who engage in sexual activity are at risk of having an 11.96 times higher vulnerability to having a miscarriage compared to pregnant women who are sexually active safely/risk-free ($OR = 11.96$). These findings reinforce the reason why fear of abortion is the biggest motive (39.45%) for a decrease in the intensity of sexual intercourse between partners in the first trimester. Clinically, it is recommended that pregnant women who find danger signs in the form of bleeding in the first trimester are obliged to postpone sexual activity completely until the bleeding completely stops.

4. Parity and Other Multi-dimensional Factors Interestingly, although parity (the number of children ever born) is often assumed to trigger the decline in uterine function due to repeated pregnancies, statistical data in the study of Yulianti et al. (2025) show different results. The chi-square test showed a value of $p = 0.617$, which means that parity independently had no significant direct relationship with the incidence of abortion at the study site. This proves that the mechanism of miscarriage is dominated by a combination of other variables. By compilation comprehensively, from the supporting literature cited by Purwanti et al. (2024), the spectrum of causes of abortion includes three main pillars:

- * Maternal Factors: Include systemic infections, chronic diseases, hormonal disorders, physical trauma, maternal psychological instability, sociodemographic factors (such as extreme age <20 years or >35 age, education level), and unsafe sexual activity.

- * Fetal Factors: Genetic abnormalities, abnormalities in embryonic development, and empty pregnancy conditions (blighted ovum).
- * External Factors: Environmental radiation exposure, free consumption of anti-inflammatory drugs, and smoking habits. Abortion is defined as the threat or expulsion of the results of conception before the fetus can live outside the womb, which is characterized by a gestational age of less than 20 weeks or The weight of the fetus is less than or equal to 500 grams.

Based on the results of a synthesis of literature from several recent clinical studies, the incidence of abortion is influenced by complex multi-factor interactions, including maternal physiological aspects, reproductive history, and intimate behavior during pregnancy. Broadly speaking, the risk factors that cause abortion can be classified into maternal factors (maternal conditions), fetal factors (fetal), and external factors 1. Anemia Factors in Pregnancy (Widiastuti et al., 2025; Yulianti et al., 2025)

Anemia is one of the most common pregnancy complications found in the first trimester and is closely related to an increased risk of miscarriage. A decrease in hemoglobin (Hb) levels in pregnant women to below 11 gr% (or extreme conditions of less than 7 gr%) inhibits the process of circulation and transport of nutrients and the supply of essential oxygen to the placenta. This disruption of the supply of oxygen and nutrients in turn triggers growth abnormalities in the result of conception or even

death of the fetus, thus triggering the body's reaction to release the results of conception (spontaneous abortion). The statistical analysis presented by Yulianti et al. (2025) proves significantly. Based on the results of analysis from various studies, the incidence of abortion is influenced by complex multi-factor interactions. These risk factors can be classified into maternal physiological conditions (age, nutritional status, anemia), reproductive history (parity, abortion history), as well as fetal and external factors. The age of the mother during pregnancy is the most consistent variable and has been shown to significantly affect the risk of abortion. The safe reproductive age for pregnancy is at range of 20 to 35 years, while the age of under 20 years and above 35 years is categorized as high risk of cartilage age. This significant relationship is confirmed by findings from the three studies evaluated: Neni Riyanti, Risa Devita, & Dwi Wahyuni (2021) found a significant positive correlation between age and a high risk of pregnancy ($p = 0.000$; $r = 0.307$). Refer to the supporting literature in his study (Riesta, 2016), There is a direct connection meaning between the mother's age and the incidence of abortion ($p = 0.009$). It is a significant predisposing factor for abortion. Research by Anggraini et al. (2025) shows that there is a real relationship between parity and the incidence of abortion ($p = 0.008$). with a value of $p = 0.008$ and $OR = 3.074$, which means that the parity group is at risk (pregnancy first or more than 3 pregnancies) had a 3,074 times greater risk of having an abortion. Pathophysiologically, the high multipara group or grandemultipara has greater susceptibility due to weakening of the reproductive organs. Placental implantation scars from previous pregnancies trigger degeneration, necrosis, and decreased vascularization of the endometrial wall. As a result, the uterine environment is no longer fertile to receive the results of a new conception, so that the of nutrients and oxygenation to the results of conception is not optimal, triggering the release of the results of conception from the Location implantasi.

3. Previous Abortion History (Anggraini, Arif, & Septina, 2025)

Past reproductive experience is a strong indicator of subsequent pregnancy. Based on empirical data from Anggraini et al. (2025), there is a very close relationship between previous abortion history and current abortion incidence ($p = 0.000$ and $OR = 8.000$). Mothers who have had a miscarriage have an 8-fold risk greater to experience similar events. Theoretically, the condition of recurrent abortion is generally caused by the presence of anatomical abnormalities that persist in the mother, such as extensive uterine lacerations or abnormalities in the cervix and uterus, which make it difficult for the pregnancy to last a long time. (Batubara, Surbakti, and Laksmana 2026)

4. Nutritional Status and Anemia (Yuliani, Adyas, & Rahayu, 2023)

The health condition and nutritional fulfillment of the mother pre-pregnancy and during the first trimester play a crucial role in preventing abortion. 2023 identifies that malnutrition and anemia are closely related to miscarriage:

* Anemia in Pregnancy: Results in disruption of the process nutrient circulation as well as uteroplacental oxygenation. Iron deficiency triggers an imbalance in the blood supply to the fetus, which interferes with the growth of conception results and increases the risk of abortion ($p = 0.006$; $OR = 2,958$)(Novita et al. 2026)

CONCLUSION

Based on the synthesis of data from the evaluated research, the incidence of abortion in pregnant women is the impact of a complex multi-factor interaction, which is broadly classified into three main aspects:

* Maternal Physiological Conditions: Extreme maternal age (<20 years and >35 years) is the most consistent risk factor, even the most dominant factor in triggering miscarriage. In addition, poor nutritional status (such as SEZs) and anemia conditions have been shown to significantly disrupt the supply of nutrients and oxygenation to the fetus, thus triggering spontaneous abortion.

* Maternal Reproductive History: Mothers with high parity (giving birth >3 times) are prone to abortion due to decreased uterine wall function. Meanwhile, the existence of a history of abortion in previous pregnancies increases the risk of recurrent miscarriage by up to 8 times due to the potential for persistent reproductive anatomical abnormalities.

* Behavioral Factors and Pregnancy Distance: Too close a pregnancy gap (<24 months) makes the condition of the uterus not fully recovered, which when combined with certain physical activity or habits at the beginning of the trimester, increases the chances of pregnancy failure before the age of 20 weeks. Overall, monitoring early pregnancy through quality Antenatal Care (ANC), nutritional fulfillment, and careful family planning are crucial strategies to anticipate these risk factors in order to reduce maternal mortality

SUGESTION

Based on the conclusions of various literature that examines the factors that cause abortion in pregnant women, several strategic recommendations can be submitted to various relevant parties:

1. For Health Workers and Health Service Facilities

* Optimization of Early Screening (K1 Visit): Health workers are expected to tighten early pregnancy screening in the first trimester, especially to identify pregnant women with high risk factors such as extreme age (<20 or >35 years), anemia, malnutrition status (KEK), and previous abortion history.

* Continuous Counseling: Increase the provision of education and KIE (Communication, Information, and Education) regarding the importance of fulfilling balanced nutrition, limiting risky physical/sexual activities in early pregnancy, and adherence to the consumption of blood supplement tablets (Fe) to prevent anemia.

2. For Pregnant Women and Families

* Family Planning: Expectant mothers and couples are advised to plan their pregnancy at a healthy reproductive age (20–35 years) and set a safe birth distance (at least 2 years or 24 months) to ensure optimal uterine recovery.

* Increased Health Awareness: Pregnant women are expected to be more active in checking their pregnancy regularly (Antenatal Care) from an early age, maintaining nutritional intake, and immediately consulting a doctor if they experience signs of danger such as spots or abdominal cramps.

3. For the Next Researcher

* Expansion of Study Variables: Subsequent researchers are advised to explore other risk factors that have not been widely discussed in this literature, such as immunological factors, fetal genetic/chromosomal abnormalities, levels of maternal/psychological stress, as well as exposure to toxic substances in the work environment.

* Stronger Methodology: It is hoped that future researchers can use the design prospective research (such as cohort studies) or conducting Meta-Analysis with a wider and multicentric sample coverage in order to obtain more accurate data generalizations about the causes of abortion. The literature review you have compiled is quite comprehensive, but there are some suggestions that can strengthen its quality. First, it is recommended to expand the variables examined to include other psychosocial factors such as employment status, economic status, and access to health services, as these can

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