



Literature review: relationship between anemia and abortion in pregnancy

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ABSTRACT

WHO data shows the number of the population experiencing anemia worldwide is 83.2% from 114 countries, while in Southeast Asia it reaches 97.8%. The incidence of anemia in pregnant women in Indonesia ranks fourth together with Thailand, which is 30%. This figure is higher than Malaysia and Singapore, namely 27% and 28%. WHO reports that there are 52% of pregnant women experiencing anemia in developing countries. The prevalence of anemia in pregnant women in Indonesia is 70%, or 7 out of 10 pregnant women suffer from anemia. To review some of the literature on the relationship between anemia and abortion in pregnancy. The research design uses Literature Review or literature review by collecting data from the topic of anemia and the incidence of abortion in pregnancy. Data sourced from searches using the word abortion, anemia and pregnancy through databased Scient direct, PubMed and books. Eight articles stated that there was a significant relationship between anemia and abortion. One article showed different research results, namely that there was no significant relationship between anemia and abortion. Anemia can be one of the causes of abortion in pregnancy, but abortion is not always caused by anemia during pregnancy.

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1. INTRODUCTION

Catheterization One of the most common nutritional problems in pregnant women is nutritional anemia, which is the biggest micronutrient problem and the most difficult to overcome worldwide (Pramudyaningrum et al., 2019). The World Health Organization (WHO) reports that 52% of pregnant women experience anemia in developing countries. According to WHO, the limit of normal hemoglobin levels based on age and sex states that children 6 months - 59 months (11.0), children 5 years - 11 years (11.5), children 12 years - 14 years (12.0), adult men (13.0), adult women (12.0) and pregnant women (11.0) (Duddin, 2021). Data from WHO (World Health Organization) the number of people who have anemia worldwide is 83.2% of 114 countries, while for Southeast Asia it is 97.8%. The incidence of anemia in pregnant women in Indonesia ranks fourth together with Thailand, which is 30% (Sari, 2020). This figure is higher than Malaysia and Singapore, namely 27% and 28%. WHO reports that there are 52% of pregnant women experiencing anemia in developing countries (hamil dengan anemia di Palembang, 2020). Data in Indonesia (Susenas and the Ministry of Health-Unicef Survey) report that around 4 million pregnant women, half of whom have nutritional anemia and

another one million suffer from Chronic Energy Deficiency (KEK) (Mawaddah, 2021). Pregnant women who experienced CED was 16.2%, who received additional food was 79.5%, pregnant women who experienced a protein deficit was 51.9% (Tawakal, 2021). Data from Basic Health Research (RISKESDAS) shows the prevalence of anemia in pregnant women in Indonesia. by 37.1%. These data indicate that iron deficiency anemia is still a public health problem (Permatasari et al., 2020).

The prevalence of anemia in pregnant women in Indonesia is 70%, or 7 out of 10 pregnant women suffer from anemia. In the first trimester of pregnancy, little iron is needed because menstruation does not occur and fetal growth is still slow (Malang, 2022), (Yusuf et al., 2022). But in the second to third trimester (gestational age 24 weeks to 40 weeks) the volume of blood in the body of pregnant women will increase by up to 35% (Widoyoko & Septianto, 2020). This is equivalent to 450 mg of iron to produce red blood cells. Red blood cells must carry more oxygen to the fetus. Meanwhile, when giving birth, pregnant women need additional iron as much as 300-350 mg due to blood loss. Until the time of delivery, pregnant women need about 40 mg of iron per day or twice the need for non-pregnant conditions (MUTTAALLIYAH, 2018). Most pregnant women Iron nutritional anemia is caused by consumption of foods that do not meet nutritional requirements and increased needs, in addition to repeated pregnancies in a short time Iron deficiency anemia during pregnancy is defined as a condition in which the body has a hemoglobin (Hb) level below 11 gr/dl (Dewi, 2021). If a pregnant woman suffers from iron deficiency anemia, negative impacts can occur both on the mother and the baby she is carrying and can increase the risk of maternal and infant mortality (Astuti & Ertiana, 2018). Negative impacts on mothers include; difficulty breathing, fainting, fatigue, increased heart rate, difficulty sleeping, incidence of perinatal infections, pre-eclampsia, and increased risk of bleeding. Bleeding during early pregnancy is called miscarriage or abortion, while in late pregnancy it is called antepartum bleeding (Pulungan et al., 2020). The theoretical limit between young and late pregnancies is 28 weeks, considering the possibility of fetal survival outside the uterus. Causes of antepartum bleeding include placenta previa, placental abruption, and bleeding of unknown origin (Evanovita & Mariyana, 2019).

One of the causes of high rates of spontaneous abortion is anemia caused by impaired nutrition and oxygen circulation to the uteroplacental circulation so that it can directly affect the growth of the fetus in the womb through the placenta (Wulandari et al., 2021), (Fariski et al., 2020). Miscarriage/abortion is a health problem that occurs in pregnant women as well as in the fetus in the womb where the gestational age is less than 22 weeks or the fetus weighs 1000 grams and this abortion can occur due to the mother's weak condition, unwanted pregnancies and pregnancies outside of marriage (Erpiyana & Suratini, 2013). Miscarriage or abortion that often occurs is incomplete abortion, in which the fetus that is contained has partially come out and some is still in the uterus. If this miscarriage occurs, it must be treated immediately to deal with heavy bleeding which can cause death in the mother (Khadijah, 2016).

(Irayani, 2016) with the title "Analysis of the Relationship of Anemia in Pregnancy and Abortion Incidence at Demang Se Island Raya Hospital, Central Lampung Regency" shows that the variable associated with the incidence of abortion is anemia with p-value = 0.000 OR: (3.317), age with p-value = 0.048 OR: (2.781), parity with p-value = 0.040 OR: (3.048), history of abortion with p-value = 0.036 OR: (5.526). Multivariate analysis found that anemia has a 2.881 times greater risk of having an abortion than pregnant women who are not anemic after controlling for age and history of abortion (Irayani, 2016).

The same thing was also mentioned (Mauluddina, 2022) that there is a relationship between anemia gravidarum and abortion with a p-value = 0.001. The results of the odds ratio were 9.533 with a 95% confidence interval, which means that anemia is a risk factor for abortion. If the hemoglobin level is <11 gr%, there is a risk of 9.533 times to have an abortion compared to the hemoglobin level ≥11 gr%. Based on the research by Mauluddina and Rosita, there are still significant similarities between the relationship between anemia in pregnant women and the incidence of abortion 7,8 (Rosita & Theresia, 2018).

2. RESEARCH METHOD

Research design

The research design is Literature Review or literature review. Library research or literature review (literature review, literature research) is research that examines or reviews critically the knowledge, ideas, or findings contained in the literature. as well as formulating their theoretical and methodological contributions to specific topics. The nature of this research is descriptive analysis, namely the regular breakdown of the data that has been obtained. The author identifies and analyzes the results of previous research on the relationship between anemia and abortion in pregnancy. Then given an explanation, a conclusion is drawn so that it can be well understood by the reader. This literature review is carried out by searching research articles, thesis (S₂), Science Direct, and Pubmed.

Data Type

Data is a collection of information needed for decision making. The type of data used in this research is primary data. The data obtained is not from direct observation, but the data is obtained from the results of previous researchers. The data sources in question are in the form of a thesis (S₂), dissertation (S_{d3}), and research articles related to research objectives based on research inclusion criteria.

Method of collecting data

The collection of literature reviews used several stages including searching for articles based on the topic outline, grouping articles based on relevance to the topic and year of research and then sorting the explanatory structure and comparison of related data. The data used in this study comes from the results of research that has been done. Literature study by collecting data in the library, reading, taking notes, and processing research materials. Based on the results of a literature review search through the Google Scholar publication database, using the keywords "abortion, "anemia "pregnancy", in the Scient Direct and PubMed publication databases using the keywords "abortion, "anemia" pregnancy, researchers found 220 journals that matched the word the key. The research articles were then screened or filtered again and 96 articles were obtained. Articles were sorted again based on the inclusion criteria that had been determined, so that 9 articles were obtained that would be reviewed according to the inclusion criteria.

Table 1. Inclusion and Exclusion Criteria

Criteria	inclusion	exclusion
Time period	2015 – 2021	< 2015
Subject	Pregnant mother	Pregnant mother
Language	Indonesian English	Not Indonesia – England
Journal Type	Full Research Article <i>Text</i>	Research Articles do not <i>FullText</i>
Content Theme	Mention the impact of the relationship between anemia and the incidence of abortion in Pregnancy	Did not mention the impact of the relationship between anemia and the incidence abortion in pregnancy

Data analysis

Literature review is used to synthesize using the narrative method and grouping data types, extracted the same according to the measurement results to answer the objectives. Then summarize each literature to see similarities, differences, and see the relationship between one article and another. Identify the themes from the results of each study in the literature where the resulting themes should reflect the research questions from the literature review. Theme development by combining all the findings, then naming each theme that is close to the results of the literature. Comparing and reviewing each theme, checking for similarities and differences then analyzing in depth and considering how each theme might relate to one another.

3. RESULTS AND DISCUSSIONS

Results

The results of the data analysis will then determine the PICO (population, intervention, comparison, outcome) so that it can be seen whether the data collected can prove that there is a significant relationship to the topic under study. To facilitate the presentation of the results of the literature study, a synthesis is carried out using the following matrix:

Table 2. List of reviewed articles

No	Researcher	Research Title and Year	Research purposes	Research design	Population, sample and sampling technique	Variable	Results
1	Mersiana Sri Handayani, and Fitriani	Relationship between Anemia and Maternal Age with Abortion Incidence at Bhayangkara Hospital Makassar, 2017	Knowing the relationship between anemia and maternal age with the incidence of abortion at Bhayangkara Hospital	Using a Cross Sectional Study approach	Population: 720 people Sample: 87 people, Sampling Technique: Systematic Sampling	Anemia, age and incidence of abortion	Most abortions at Bhayangkara Hospital Makassar occur in anemic mothers. Abortion at home Bhayangkara Makassar disease mostly occurs in mothers with low risk. There is a significant relationship with anemia With the incidence of abortion and there is no significant relationship between maternal age and the incidence of abortion. level of anemia mostly experienced anemia, namely 49 people (63.6%) and based
2	Beautiful Jayani	Anemia Level Associated With Incident	determine the relationship between the level of anemia with abortion incident	AI correlation analysis with approximation	The population in this study were all pregnant women in Ndi Health Center	Anemia and Abortion Incidence	Shows that there is a relationship between iron deficiency anemia in pregnant women and the incidence of abortion in the postpartum room at Anutapura General Hospital, Palu.
3	Lisda Widiyanti	The Relationship between Iron Deficiency Anemia in Pregnant Women and Abortion in the Cassowary Room at Home Anutapura Palu, 2017	The relationship between iron deficiency anemia in pregnant women and the incidence of abortion is known.	using a cross sectional study design.	Population: all pregnant women <20 weeks gestation who were treated in the postpartum room for this study Sample: 46 Sampling techniques: consecutive sampling.	Anemia and abortion	The results of this study found that out of 66 pregnant women, 40 mothers (60.6%) had anemia, and 33 mothers (50%) had incomplete abortions. The results of this study found
4.	Fitri Apriyanti	Relationship between Anemia and Incomplete Abortion Bangkinan General Hospital in 2019	Knowing the relationship between anemia and the incidence of incomplete abortion in hospitals Bangkinang	Analytics with Case Control.	Population: 137 pregnant women. The sample in this study amounted to 33 Sampling technique: probability	Anemia and the incidence of abortion	

				sampling		that there was a relationship between anemia and the incidence of incomplete abortion indicated by value $P=0.006$ ($P<0.05$) ³⁰
5	Nova Yulita	Relationship between Anemia and Age of Pregnant Women with Incomplete Abortion, 2017	determine the relationship between anemia and the age of pregnant women with incomplete abortion.	Quantitative analysis with retrospective design	Population: all pregnant women with gestational age <20 weeks recorded in the medical record	The results of the Chi-square test that was carried out obtained P value = 0.002, meaning P value <0.05 There is a relationship between anemia and incomplete abortion and there is no relationship between maternal age and the incidence of incomplete abortion where the p value is > 0.005.
6	siti Khadijah	The Relationship between Anemia and Age in Pregnant Women with the Incidence of Incomplete Abortion in Bukit Tinggi Hospital, 2016	To determine the relationship between anemia and the age of pregnant women with the incidence of incomplete abortion at RSUD Dr. Achmad Mochtar Bukittinggi	Descriptive analytic with case control design (case control)	Population: The population in this study were all pregnant women in the first and second trimesters at RSUD Dr. Achmad Mochtar Sample: 112 people Technique Sampling: Simple Random Sampling	Conclusion exists There is a significant relationship between age and abortion incident incomplete P value = 0.002 ($P<0.005$), and there is no significant relationship between anemia with incident abortion incomplete value =0.052 ($P<0.005$)

Discussion

Based on the reviewed articles, in total it is known that 2 articles were published in 2015, 2 articles were published in 2016, and 4 articles were published in 2017, and 1 article was published in 2019.

Equation Analysis (Compare) From Each Research

Judging from the results of the analysis of the 9 articles that have been reviewed, 8 articles state that there is a relationship between anemia and the incidence of abortion. Abortion is a state where a pregnancy is interrupted where the fetus is not yet able to live alone outside the uterus, it cannot be interpreted if the fetus weighs between 400-1000 grams or gestational age less than 28 weeks²⁰. This is in line with what was conveyed by Proverawati, the consequences that will occur in pregnancy anemia, including in young pregnant women (first trimester), namely abortion, missed abortion, and congenital abnormalities and in the second trimester of pregnancy can cause premature labor, antepartum bleeding, impaired fetal growth in uterus, intrauterine asphyxia until death, Low birth weight (LBW), gestosis and susceptibility to infection, low IQ, cardiac decompensation, maternal death¹⁸. A pregnant woman with a single fetus needs about 1000 mg of iron during pregnancy or rises around delivery and the remaining 840 mg is lost. As much as 300 mg during pregnancy or an increase of about 200-300%. The estimated amount of iron that needs to be stockpiled during

pregnancy is 1040 mg. During pregnancy, 200 mg of iron is retained by the body during childbirth and the remaining 840 mg is lost. As much as 300 mg of iron is transferred to the fetus with details of 50-75 mg for the formation of the placenta, 450 mg for increasing the number of red blood cells and 200 mg lost during delivery. The need for iron in the first trimester is relatively less, namely around 0.8 mg per day, but in the second and third trimesters it increases 6.3 mg per day³⁵

One of the causes of high rates of spontaneous abortion is anemia caused by impaired nutrition and oxygen circulation to the uteroplacental circulation so that it can directly affect the growth of the fetus in the womb through the placenta. Miscarriage/abortion is a health problem that occurs in pregnant women as well as in the fetus in the womb where the gestational age is less than 22 weeks or the fetus weighs 1000 grams and this abortion can occur due to the mother's weak condition, unwanted pregnancies and pregnancies outside of marriage.

Research design

The research design used by all reviewed articles has the same design, namely using a non-experimental quantitative design. Overall the research design used is an observational design which is part of a non-experimental quantitative research, where research data is collected through observation or observation. Observation techniques are used when the data collected is related to human behavior, natural phenomena and the number of respondents observed is not too large. Observation targets include three things, namely: actors (actors), places and activities. Based on the reviewed articles, it can be seen that 2 articles used a quantitative cross-sectional study design, 2 articles used a correlation analytic design with a cross-sectional approach, 3 articles used an analytic research design with case control. 1 article used a retrospective quantitative design and 1 article used a survey design with a cross-sectional approach. Cross sectional is a study to study the correlation between risk factors by approaching or collecting data at one time only.

Population, Sample and Sampling Technique

The study population used 8 articles had similarities where the study population was registered pregnant women without distinguishing gestational age. The population according to Sugiyono (2017) is an area of generalization of objects that have certain qualities and characteristics set by researchers to study and then draw conclusions. Determination of the population is an important stage in research. Population can provide useful information or data for a study³⁷. The highest number of samples in the research articles reviewed were 95 respondents and at least 46 respondents. The sample is part of the population that has certain characteristics or conditions to be studied, or some members of the population are selected using a certain procedure so that it is expected to represent the population. The sampling technique from the reviewed articles, 8 articles have similarities, using probability sampling and 3 articles using systematic sampling method. Systematic sampling is a way of taking samples determined randomly, the next one is taken based on a certain interval²⁸.

The other five articles also have the same sampling technique, namely simple random sampling. Simple random sampling is a sampling technique by providing equal opportunity to the population to be sampled. The sampling technique from the articles reviewed as a whole uses the Random Sampling/Probability Sampling technique.

Research instrument

Nine research articles were reviewed, 5 research articles were known to use the same instrument for data collection, namely observation sheets/medical record check lists. Two articles using a questionnaire. According to Sugiyono, 2017 a questionnaire is a data collection technique that is carried out by giving questions or written statements to respondents to answer.

Ways of Data Analysis

Of the nine articles that were reviewed, 8 articles had similarities in the method of analysis, namely using the SPSS with the chi square test. Data analysis is an activity after data from all respondents or other data sources has been collected, activities in conducting data analysis are grouping data based

on variables, types of respondents, tabulating data based on variables from all respondents presenting each variable data studied, performing calculations, to answer the problem formulation²⁸. Bivariate analysis was carried out to determine the relationship between anemia and the incidence of abortion in pregnant women, the statistical test used was the chi square. This test is used to test the hypothesis if the population consists of two or more classes with categorical data.

Analysis of Differences (Contras) From Each Research

a. Results

Judging from the results of the analysis of the 9 articles that have been reviewed, 1 article shows research results that are different from the other 8 articles. Siti Khadijah's research states that there is no significant relationship between anemia and the incidence of abortion, but there is a significant relationship between age and the incidence of incomplete abortion. These results are in accordance with the theory which states that abortion is caused by fetal factors due to genetic defects, paternal factors such as chromosomal abnormalities in sperm and maternal factors such as age, parity, history of previous miscarriages, genital area infections, chronic diseases suffered by the mother (hypothyroidism, anemia), uncontrolled diabetes, drug use and environmental factors (tobacco, alcohol, caffeine, radiation, contraceptives, environmental toxins), abdominal trauma, uterine defects. Causes of spontaneous abortion include parity, maternal age, infectious diseases, chronic diseases, chronic disorders, endocrine disorders, malnutrition, anemia, gestational age, drug use, and other environmental factors: alcohol, tobacco, caffeine, and radiation. The risk of spontaneous abortion increases due to the large number of parities, the age of the mother and father and the distance between pregnancies is too close. Parity is the number of births a woman has ever had. Parity one is at risk because it is not ready both medically (reproductive organs) and mentally. Parity is more than four, physically the mother has experienced setbacks to undergo a pregnancy which is not easy. Most mothers who have a parity of more than three are found to be over 35 years old. The higher the parity, the higher the risk for pregnancy and childbirth.

b. Population, Sample and Sampling Technique

The research population used, 2 articles have differences in which 1 research population article used is primigravida pregnant women and 1 other article uses a population which is the total number of pregnant women in the 1st and 2nd trimesters. Pregnancy in the 1st trimester is a pregnancy aged 0-12 weeks starting from the time of fertilization until the gestation period reaches the age of 12 weeks. The second trimester of pregnancy is the gestation period from week 14 to week 28. According to Sarwono (2009) Anemia that often occurs in pregnancy is caused by the condition of the mother with Hb levels below 11 gr% in trimesters 1 and 3 or levels <10.5 gr% in the 2nd trimester these limit values and the difference with the condition of non-pregnant women due to hemodilution, especially in the 24th trimester. Research sampling technique, Of the 9 articles reviewed, it was found that 1 article used a different sampling technique, namely using a sampling technique with consecutive sampling. The sample is part of the number and characteristics possessed by the population⁴¹. Sampling in this study was carried out by consecutive sampling, namely selecting samples by specifying subjects who met the research criteria for a certain period of time so that the required number of clients was fulfilled.

c. Research Instruments

Nine research articles were reviewed, 1 research article was known to use different instruments in data collection, namely using survey sheets. Asmadi Alsa (2004) suggests that survey design is a procedure in which researchers carry out surveys or provide questionnaires or scales on one sample to describe attitudes, opinions, behaviors, or characteristics of respondents. From the results of this survey, researchers make claims about trends in the population. The research instrument used in this study was a survey form and a questionnaire or questionnaire form. Survey forms are used by researchers to collect information more easily but with maximum results. This method is carried out by making direct observations of an ongoing or ongoing process.

d. How to analyze data

Of the nine articles that were reviewed, 1 article had a difference in how to analyze the data by means of rank spearman. Data analysis is a simplification of data into a form that is easy to understand, read and interpret. The data analyzed is data collected from the results of field research to draw conclusions. The nonparametric statistical data analysis method in this study is the Rank Spearman correlation method. Jonathan and Ely (2010) state that the Rank Spearman correlation is used to determine the relationship or influence between two ordinal scale variables, namely the independent variable and the dependent variable. Association size which requires all variables to be measured at least on an ordinal scale, so that the objects or individuals studied can be ranked in many successive series⁴³. The coefficient based on this ranking can use the Rank Spearman correlation coefficient. The following is the correlation analysis formula

View (Synthesize) Research

Based on the 9 articles reviewed, 8 articles stated that there was a relationship between iron deficiency anemia in pregnant women and abortion. However, 1 article stated a different matter, which stated that there was a non-significant relationship between anemia and the incidence of abortion. This result is different from the results of research (Wardiyah, 2016) the impact of anemia shows a significant relationship between anemia and the incidence of abortion at Abdul Moeloek Hospital, Lampung. Anemia has a 2.2 times chance of influencing incomplete abortion ⁴⁴

However, another cause of abortion is chronic illness experienced by the mother. Some of the criteria used by Daely (Medan) classify high-risk cases of pregnancy including medical complications consisting of anemia, heart disease, diabetes mellitus and hypertension, etc. ⁴⁵. Hypertension can lead to abnormal trophoblastic implantation which results in reduced placental perfusion. during implantation, the tiny villi in the placenta that eventually form the arteries do not develop and the placenta does not receive its blood supply as it should. Restriction of placental blood flow results in hypoxia and abnormalities in the placental environment. There are abnormalities in the placenta that are often found in spontaneous abortion.

Analysis of Views (Criticize) Research

One of the purposes of conducting a literature review is to provide criticism and opinions on articles that have been published (review articles). In general, the part that is criticized is the research design or research method. This is in accordance with the recommendations of several authors on how to conduct a literature review. This section is the focus of criticism in accordance with the research objective is to examine and provide conclusions from the results of the study and the conclusions will be new findings. The research article by Aryanti Wardiyah used an analytic survey research design with a cross sectional approach. Data collection used survey sheets distributed by researchers. This of course produces imperfect data where this research takes a long time to get data from respondents because it is only waiting for respondents to visit. Another weakness when filling out the survey sheet is that respondents can fill out the survey sheet simultaneously so that there is a possibility of copying each other's answers.

Abortion is a threat or expulsion of the products of conception at a gestational age of less than 20 weeks or a fetus weighing less than 500 grams. The incidence of pregnant women who experience abortion is more likely to occur in multiparas than primiparas. This is because in multiparas, the uterus has been fertilized too often so that the uterine state is weakened. Of the known events, 15-20% are spontaneous abortions or ectopic pregnancies. About 5% of couples trying to conceive will have 2 consecutive miscarriages, and about 1% of couples will have 3 or 8 more consecutive miscarriages (Prawirohardjo, 2009).

According to researchers the incidence of abortion can be prevented by managing iron deficiency anemia, namely overcoming the causes of anemia such as disease, bleeding, intestinal worms, etc. and providing nutrition / food that contains lots of iron elements, including animal meat, eggs, fish, green vegetables (Tarwoto and Wasnindar, 2007). Iron is the most abundant micro-mineral

in the human body, which is as much as 3-5 g. Iron tablets in the ferrous form are more easily absorbed than the ferric form. The preparations that are widely available, easy to obtain and cheap, as well as the most effective properties are ferrous sulfate, ferrogluconate, and ferrous fumarate.

A positive response to treatment can be seen from an increase in hemoglobin levels of 0.1 gr/dl a day from the fifth day onwards. Thus, administration of 30 g of iron three times daily will increase hemoglobin levels by at least 0.3 g/dl/week (or 10 days). Globally, this response has an impact on reducing the prevalence of anemia in pregnant women.

4. CONCLUSION

Based on the 9 articles that have been reviewed, it can be concluded that the 8 articles have the same research results, namely that there is a significant relationship between anemia and the incidence of abortion in pregnancy. One article got different results, namely that there was no relationship between anemia and abortion in pregnancy. This research only reviews articles published in 2015 to 2021, so it does not know about research published under 2015 and after 2021. For further research, it is hoped that it can review the relationship between anemia and abortion more broadly by reviewing research developments before the year 2015 and after 2021.

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