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Meta Analysis
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Effects of Pregnancy Planning, Complication, and Social Support on Depression in Pregnant Women: Meta-Analysis

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ABSTRACT

Background: Depression is a mental symptom that arises with symptoms of loss of spirit, mood swings, and disruption of daily activities. Symptoms of depression are commonly experienced by pregnant women, but symptoms of depression can be treated and prevented. Recognizing the causes or determinants of depression in pregnant women is important to prevent the onset of depressive symptoms. This study aimed to estimate the effect of planning, complications, and social support on depression in pregnant women.
Subjects and Method: A systematic review and meta-analysis was conducted using PRISMA guidelines and the PICO model. The articles used are between 2017 and 2023. Population = pregnant women. Intervention= Poor planning, complications, low social support. Comparison= Good planning, no complications, high social support. Outcome= Depression. Articles are compiled from databases such as Google Scholar, PubMed, and Science Direct. Literature search using the keywords "Planned" OR "Unplanned" AND "Complication" AND "Social Support" AND "Depression" AND "Cross Sectional". A total of 19 articles met the inclusion criteria for the meta-analysis, and were further assessed using RevMan 5.3.
Results: Meta-analysis using a cross-sectional study design of 16 primary study articles from Ethiopia, Greece, Portugal, Germany, Iceland, Sri Lanka, China, Nigeria, Tanzania, and Kenya with a total sample of 7234 subjects showed that poor planning (aOR= 1.89; CI 95%= 1.56 to 2.30; p< 0.001); pregnancy complications (aOR=2.00; CI 95%= 1.72 to 2.32; p< 0.001); Symptoms of depression improved in pregnant women and these results were statistically significant. Low social support (aOR= 1.24; CI 95%= 0.75 to 2.05; p< 0.400) increased depressive symptoms in pregnant women but was not statistically significant.
Conclusion: Poor planning, pregnancy complications, and low social support increase depressive symptoms in pregnant women.

Keywords: planned pregnancy, complications, social support, depression, expectant mothers.

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BACKGROUND

Depression is a mental disorder that causes symptoms such as loss of enthusiasm, disruption of sleep patterns and other activities. One in five pregnant women worldwide experiences depression. This will affect the mother's health and child development. Studies show a relationship between depression and birth problems such as low birth weight, prematurity, and fetal development. The prevalence of pregnant women experiencing depression is estimated at 15.6% in developing countries (Duko et al., 2019).

Research states that depression occurs 54% in the first trimester and 35.8% in the last trimester. Evidence regarding the causes of depression is still debated. Some state that depression is caused by social determinants, age, parity, and ethnicity (Wyatt et al., 2021).

Several studies mention physical, psychological factors, the presence of violence in mothers when they were young, low knowledge about pregnancy, low economic levels are causes of depression (Gelaye et al., 2016). Mothers when pregnant need support from family, lack of support from family becomes a trigger factor for depression. Likewise, when the mother has experienced a cesarean birth, it also triggers depression (Khouj et al., 2022). The purpose of this study was to estimate the magnitude of the influence of factors causing depression in pregnant women.

SUBJECTS AND METHOD

1. Study Design

This study used systematic review methods and meta-analysis was conducted with PRISMA guidelines and PICO models. Population = pregnant women. Intervention= Poor planning, Complications, Low social support. Comparison= Good planning, no complications, high social support. Results= Depression. Articles are gathered from databases such as Google Scholar, PubMed and Science Direct. Literature search using the keywords "Planned" OR "Unplanned" AND "Complication" AND "Social support" AND "Depression" AND "Cross Sectional". A total of 16 articles met the inclusion criteria for the meta-analysis, and were subsequently judged to use RevMan 5.3.

2. Meta-Analysis Steps

The meta-analysis is carried out through 5 steps as follows:

1. Formulate research questions using the PICO model
2. Search for major study articles from electronic databases such as Google Scholar, PubMed, and Science Direct.
3. Conduct screening and critical assessment of primary studies.
4. Perform data extraction and input effect estimates from each major study into RevMan 5.3. The results of the article analysis are presented in the form of aOR, with a confidence interval (CI) of 95% using model effects and data heterogeneity (I^2).
5. Interpret the results and draw conclusions.

3. Inclusion Criteria

The study inclusion criteria are full text primary research articles from 2017 to 2023 with a cross-sectional study design, analysis usingmulti-variate with Odds Ratio (OR), study subjects are pregnant women, and the outcome is depression administration.

4. Exclusion Criteria

Study articles published before 2017 and after 2023, research results that do not conform to PICO criteria or formulas in research, and articles that do not include OR.

5. Definition Operational of Variables

Pregnancy Planning is a pregnancy that is previously discussed or planned with the family about when is the right time, how the baby will be healthy in the womb, and others.

Complications are disorders that occur during pregnancy. Such disorders can affect the health of both mother and baby.

Social Support is a resource that comes from social or the closest person that is used to get help or support.

6. Data Analysis

Data analysis using RevMan 5.3. Forest plots and funnel plots are used to determine the size of relationships and heterogeneity of data. Fixed effect models are used for homogeneous data, while random effect models are used for heterogeneous data between studies.

RESULTS

The process of searching for articles in this meta-analysis was carried out using searches through journal databases, namely PubMed, Science Direct, and Google Scholar with a time span between 2017-2023. Keywords "Planned" OR "Unplanned" AND "Complication" AND "Social support" AND "Depression" AND "Cross-Sectional" Article search according to PRISMA flow chart which can be seen as follows.

Figure 1 shows the results of the prism flow chart, the main articles were obtained a total of 1,380 articles, after the deletion of duplicated articles a total of 724 articles were obtained, after that the articles were selected by taking into account the inclusion criteria, and 16 articles were included in the meta-analysis.

Figure 1 shows an overview of the study areas used in this meta-analysis spread across 3 continents namely Asia, Africa, and South America. There were 19 articles at the end of the review process. All articles use a cross-sectional study design.

Figure 1. Map of the research area on the effect of pregnancy planning, complications, and social support on depression in pregnant women

Table 1. The quality assessment result of articles with a cross-sectional study

Primary Study	Criteria													Total
	1a	1b	1c	1d	2a	2b	3a	3b	4	5	6a	6b	7	
Jama et al. (2020)	2	2	2	2	1	2	2	2	2	2	2	2	2	25
Pratiwi et al. (2019)	2	2	2	2	1	2	2	2	2	2	2	2	2	25
Febriyanti (2018)	2	2	2	2	1	2	2	2	2	2	2	2	2	25
Wyatt et al. (2021)	2	2	2	2	1	2	2	2	2	2	2	2	2	25
Chen et al. (2023)	2	2	2	2	1	2	2	2	2	2	2	2	2	25
Yang et al. (2023)	2	2	2	2	2	2	2	2	2	1	2	2	2	24
Tsakiridis et al. (2021)	2	2	2	2	1	2	2	2	2	2	2	2	2	25

Primary Study	Criteria													Total
	1a	1b	1c	1d	2a	2b	3a	3b	4	5	6a	6b	7	
Jonsdottir et al. (2017)	2	2	2	2	1	2	2	2	2	2	2	2	1	24
Wu et al. (2021)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Ayen et al. (2019)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Chuma et al. (2020)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Tegegne et al. (2023)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Kukoyi et al. (2023)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Massae et al. (2021)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Adina et al. (2022)	2	2	2	2	1	2	2	2	2	2	2	2	2	25
Wang et al. (2021)	2	2	2	2	1	2	2	2	2	2	2	2	2	25

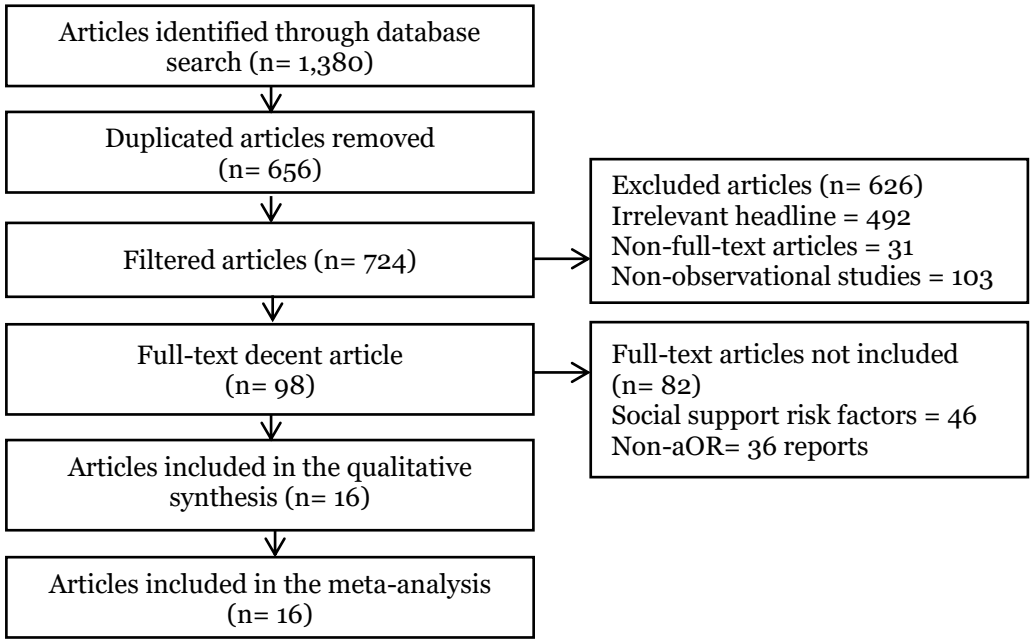

Figure 2. Results of Prisma Flow Diagrams

Description of the question criteria:

1. Formulation of study questions in the acronym PICO?
a. Is the population in the primary study the same as the population in the PICO meta-analysis?
b. Is the operational definition of the intervention, i.e. exposed status in the primary study the same as the definition intended in the meta-analysis?
c. Is the comparison, i.e. unexposed status used by the primary study the same as the definition intended in the meta-analysis?
d. Are the outcome variables studied in the primary study the same as the definitions intended in the meta-analysis?
2. Methods for choosing a subject of study:
a. In cross-sectional analytical studies, do researchers randomly select samples from populations (random sampling)?
b. Do researchers select samples based on outcome status or based on intervention status?
3. Methods for measuring exposure (intervention) and outcome variables (outcome):

a. Were both exposure and outcome variables measured with the same instruments in all primary studies?
b. If variables are measured on a categorical scale, are the cutoffs or categories used the same between primary studies?

4. Design-related bias:

If the sample is not randomly selected, have researchers made efforts to prevent bias in selecting study subjects??

5. Methods for controlling redundancy:

Has the primary study researcher made efforts to control for the influence of confusion (e.g., performed a multivariate analysis to control for the influence of a number of confounding factors)?

6. Statistical analysis methods:

a. Did the researchers analyze the data in this primary study with multivariate analysis models (e.g., multiple linear regression analysis, multiple logistic regression analysis)?
b. Whether the primary study reported the effect size or the relationship of the multivariate analysis results (e.g., adjusted OR, adjusted regression coefficient).

7. Is there no possibility of conflict of interest with the study sponsor, which causes bias in concluding atudy results?

Description of scoring:

0= No; 1= Hesitate; 2= Yes

Table 2. PICO cross-sectional article on pregnancy planning against depression

Author (Year)	Country	Sample	P	I	C	O
Ayen et al. (2019)	Ethiopia	343	Pregnant women who visit ANC in Gurage zone public health institutions	Was the pregnancy Planned? (No)	Was the pregnancy Planned? (Yes)	Depression
Duko et al. (2019)	Ethiopia	317	Pregnant Women in Hawassa	Unplanned pregnancy (Yes)	Unplanned pregnancy (No.)	Depression
Chuma et al. (2020)	Ethiopia	400	Pregnant mothers	Planned pregnancy (No)	Planned pregnancy (yes)	Depression among pregnant
Tsakirdis et al. (2020)	Yunani	505	Pregnant women	Planned pregnancy (No)	Planned pregnancy (yes)	Antenatal depression
Massae et al. (2021)	Tanzania	694	Pregnant women with gestational age between 32 and 40 weeks	Planned pregnancy (No)	Planned pregnancy (Yes)	Depressive symptoms
Wu et al. (2021)	China	3437	Pregnant women	Planned conception	Unplanned conception	Depressive symptoms
Adina et al. (2022)	Kenya	395	Pregnant women in 2nd or 3rd trimesters	Pregnancy planned (No)	Pregnancy planned (Yes)	Depressive Symptoms

Table 3. aOR and 95% CI data on pregnancy planning against depression

Author (years)	aOR	95% CI	
		Lower Limit	Upper Limit
Ayen et al. (2019)	2.11	1.0	4.44
Duko et al. (2019)	7.12	3.12	9.63
Chuma et al. (2020)	0.16	0.06	0.44

Author (years)	aOR	95% CI	
		Lower Limit	Upper Limit
Tsakirdis et al. (2020)	2.45	1.24	4.85
Massae et al. (2021)	1.36	0.88	2.10
Wu et al. (2021)	1.61	1.19	2.18
Adina et al. (2022)	4.40	2.68	7.23

Table 2 explains that there were 7 articles with cross-sectional studies on the effect of poor pregnancy planning on depression with a sample number of 6,061. Studies were conducted in countries namely Ethiopia, Greece, Tanzania, China, and Kenya.

Table 3 explains that there are 7 articles with cross-sectional studies on the effect of planning on depression with the highest aOR in the study of Takardis et al. (2020) and the lowest aOR in the study of Chuma et al. (2020).

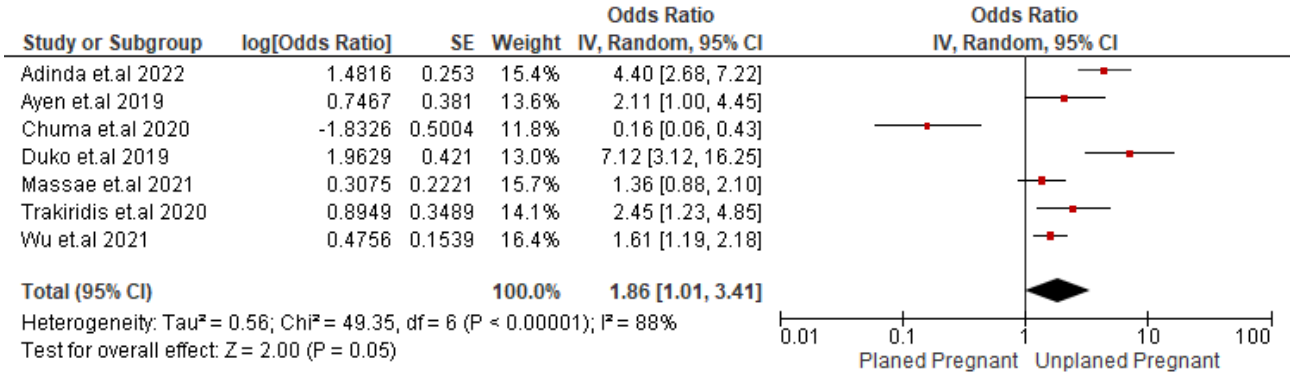

Figure 3. Forest plots the effect of pregnancy planning on depression

The forest plot in Figure 3 shows that poor pregnancy planning will affect depression. Pregnant women without prior planning increased depression 1.89 times compared with well-planned pregnant women, and the results were statistically significant (aOR= 1.86; CI 95%= 1.01 to 1.86; p= 0.050). Forest plots showed high heterogeneity of data across primary studies (I^2= 88%; p< 0.001), thus calculating the estimated average effect using a random effect model approach.

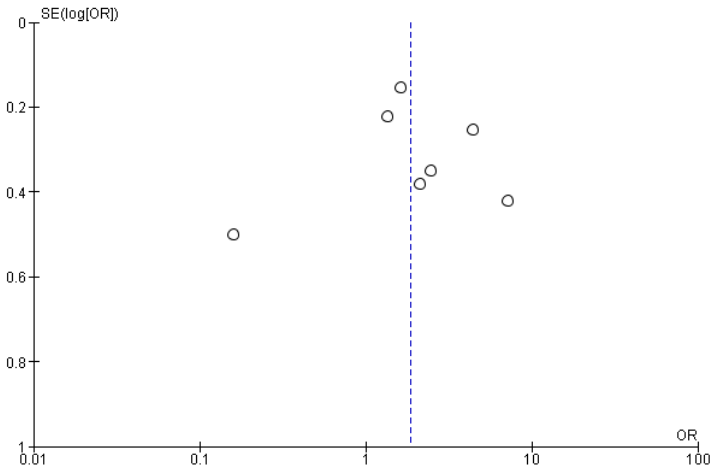

Figure 4. Funnel plot of the effect of pregnancy planning on depression

The funnel plot in Figure 4, shows an unbalanced distribution of estimated influences to the right and left of the vertical line of the estimated mean effect, where the distribution lies inside and outside the triangle. Thus, the funnel plot indicates the presence of publication bias.

Table 4. PICO cross-sectional article on the effect of complications on depression

Author (Year)	Country	Sample	P	I	C	O
Ayen et al. (2019)	Ethiophia	343	Pregnant women (ANC in Gurage zone PHC)	Complication during delivery (Yes)	Complication during delivery (No)	Depression
Duko et al. (2019)	Ethiopihia	317	Pregnant Women in Hawassa	Current pregnancy complication (Yes)	Current pregnancy complication (No)	Depression
Chuma et al. (2020)	Ethiophia	400	Pregnant mothers	Obstetric complication (yes)	Obstetric complication (No)	Depression among pregnant
Wu et al. (2021)	China	3437	Pregnant women	Pregnancy complications (Yes)	Pregnancy complications (No)	Depressive symptoms
Wyatt et al. (2021)	Sri Lanka	505	Pregnant Women	Complications	No complications	Depression
Massae et al. (2021)	Tanzania	694	Pregnant women	Obstetric complications (Yes)	Obstetric complications (No)	Depressive symptoms
Wang et al. (2021)	China	15.428	Pregnant women	Pregnancy complications	No pregnancy complications	Probable depression
Adina et al. (2022)	Kenya	395	Pregnant women in 2nd or 3rd trimesters	Pregnancy complications	No pregnancy complications	Depression
Schauer et al. (2023)	Jerman	564	Pregnant Women	Complications	No complications	Depression
Pratiwi et al. (2019)	Portugal	1698	Pregnant Women	Complications	No complications	Depression
Yang et al. (2023)	China	1963	Pregnant Women	Complications	No complications	Depression
Chen et al. (2023)	China	1338	Pregnant women	Pregnancy Complications	No pregnancy complications	Postpartum Depression
Kukoyi et al. (2023)	Nigeria	320	Pregnant women	Pregnancy complications	No pregnancy complications	Depression

Table 5. adjusted Odds Ratio (aOR) of the effect complications and depression

Author (year)	aOR	95% CI	
		Lower Limit	Upper Limit
Ayen et al. (2019)	4.42	2.06	9.48
Duko et al. (2019)	4.89	3.01	7.94
Chuma et al. (2020)	30.38	3.14	293.96

Author (year)	aOR	95% CI	
		Lower Limit	Upper Limit
Wu et al. (2021)	1.79	1.33	2.42
Wyatt et al. (2021)	2.67	0.58	12.29
Massae et al. (2021)	2.33	1.43	3.80
Wang et al. (2021)	0.99	0.09	10.89
Adina et al. (2022)	0.90	0.41	1.98
Shcauer et al. (2022)	1.48	0.17	12.88
Vieira et al. (2022)	1.15	0.89	1.50
Yang et al. (2023)	7.44	4.43	12.50
Chen et al. (2023)	2.52	1.09	5.87
Kukuoyi et al. (2023)	0.84	0.32	2.22

Table 4 explains that there were 13 articles with cross-sectional studies on the effect of complications on depression with a sample number of 27,402. The study was conducted in countries namely Ethiopia, China, Sri Lanka, Germany, Tanzania, Portugal, Kenya and Nigeria.

Table 5 explains that there are 13 articles with cross-sectional studies on the effect of complications on depression with the highest aOR in Chuma et al. (2020) and the lowest aOR in Kukoyi et al. (2023).

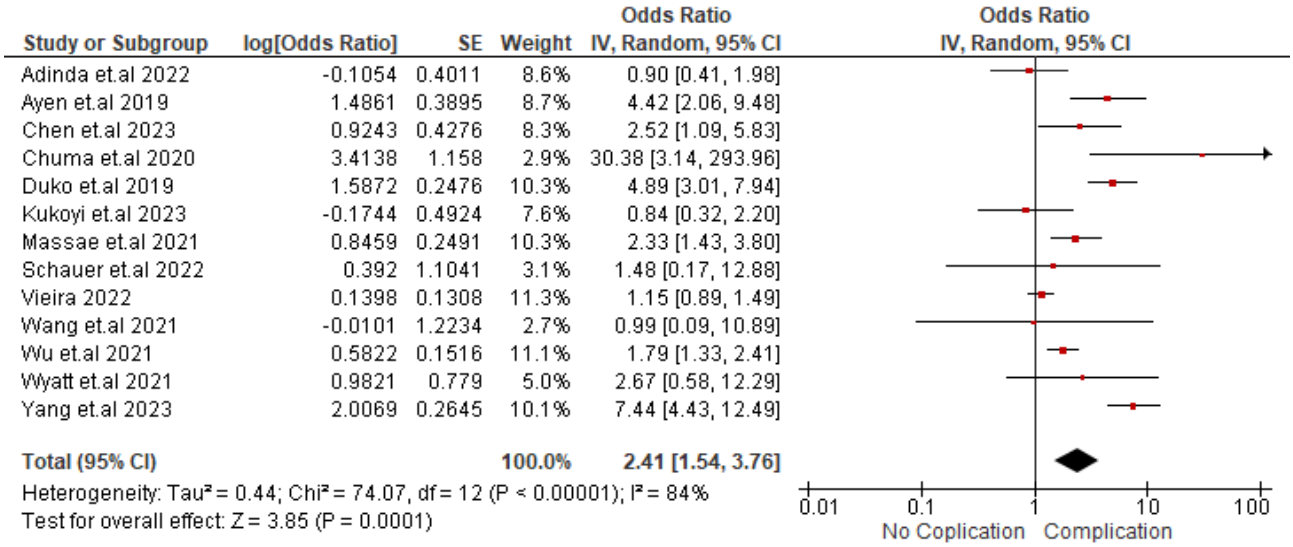

Figure 5. Forest plots the effect of complications on depression in pregnant women

Forest plot in Figure 5 shows that pregnant women who experience complications increase 2.00 times depressive symptoms, a statistically significant increase (aOR= 2.41; CI 95%= 1.54 to 3.76; p< 0.001). The forrest plot also showed heterogeneity of high impact estimates across primary studies (I^2= 84%; p< 0.001). Thus, the calculation of the average influence estimation is carried out using the random effect model approach.

The funnel plot in Figure 6 shows a distribution that tends to be equally large to the right and to the left of the average vertical line. Thus, the funnel plot does not identify any publication bias.

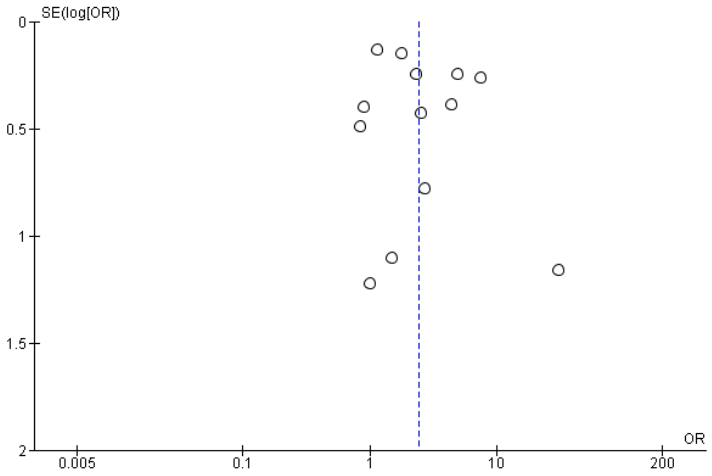

Figure 6. Funnel plot of the effect of complications on depression

Table 6. PICO cross-sectional article on the effect of social support on depression

Author (Year)	Country	Sample	P	I	C	O
Jonsdottir et al. (2017)	Island	562	Pregnant women	Low social support	High social support	Depression
Duko et al. (2019)	Ethiopia	317	Pregnant women	High social support	Low social support	Depression
Massae et al. (2021)	Tanzania	694	Pregnant women (gestational age 32-40 weeks)	High male partner support	Low male partner support	Depressive symptoms
Wang et al. (2021)	China	15.428	Pregnant women	High social support	Low social support	Probable depression
Viera et al. (2019)	Portugal	1698	Portuguese pregnant women	High social support	Low social support	Presence of Depressive Symptoms
Chen et al. (2023)	China	1338	Pregnant women	Poor Family Support	Good Family Support	Postpartum Depression
Kukoyi et al. (2023)	Nigeria	320	Pregnant women	Poor Social support	Strong Social support	Depression in antenatal women
Tegegne et al. (2023)	Ethiopia	407	Pregnant women prisoners	Strong social support	Low social support	Depression

Table 6 explains that there were 8 articles with cross-sectional studies on the effect of support on depression with a sample number of 20,764. The study was conducted in Iceland, Ethiopia, Tanzania, China, Portugal, and Nigeria.

Table 7. Data of aOR and 95% CI of the effect of social support on depression

(Author, year)	aOR	95% CI	
		Lower Limit	Upper Limit
Jonsdottir et al. (2017)	1.56	0.66	3.69
Duko et al. (2019)	2.14	1.49	3.07
Massae et al. (2021)	0.71	0.48	1.05
Wang et al (2021)	0.86	0.85	0.87
Vieira et al. (2022)	0.30	0.23	0.39
Chen et al. (2023)	2.46	1.07	5.65
Kukoyi et al. (2023)	0.92	0.40	2.11
Tegegne et al. (2023)	8.13	3.43	19.27

Table 7 explains that there are 8 articles with cross-sectional studies on the effect of social support on depression with the highest aOR in the study of Tegegne et al. (2023) and the lowest aOR in the study of Vieira et al. (2022).

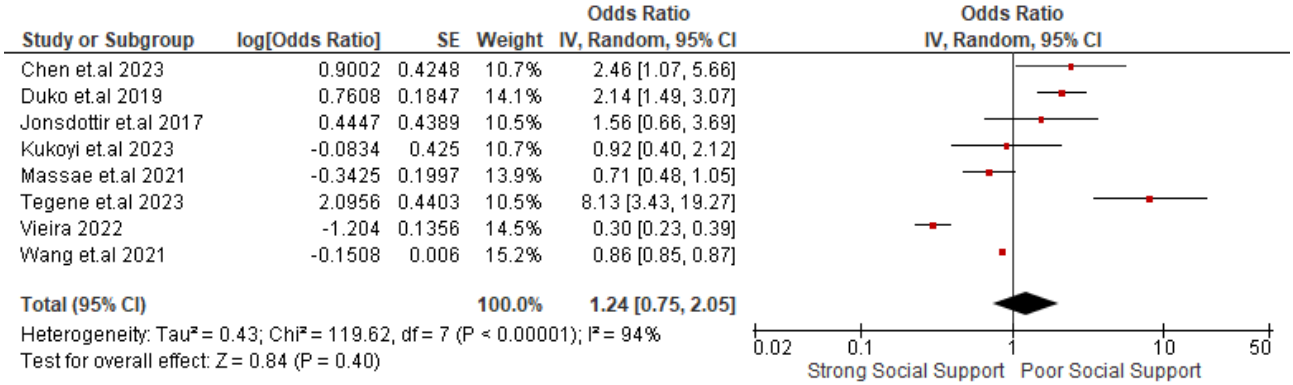

Figure 7. Forest plots the effect of social support on depression

Forest plot in Figure 7 shows that low social support increases depression in pregnant women (aOR= 1.24; CI 95%= 0.75 to 2.05; p< 0.400), but not statistically significant. The forrest plot also showed heterogeneity of high impact estimates across primary studies (I^2= 94%; p<0.001). Thus, the calculation of the average influence estimation is carried out using the random effect model approach.

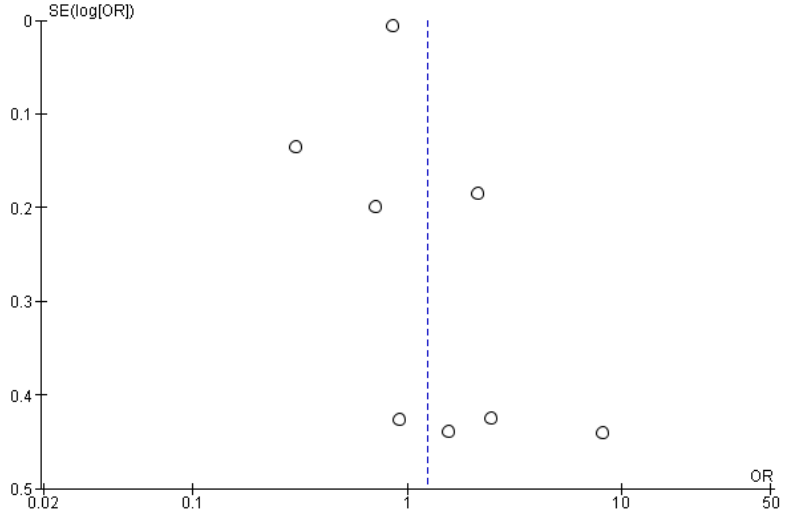

Figure 8. Funnel plots the effect of social support on depression

The funnel plot in Figure 8 shows a greater estimated distribution of influence on the right than on the left of the mean vertical line. Thus, the funnel plot identifies publication bias in the meta-analysis.

DISCUSSION

1. The effect of pregnancy planning on depression of pregnant women

Depression is a problem that is often experienced by pregnant women. Depression not only interferes with the health of the mother but also the fetus. Various factors that cause depression during pregnancy include pregnancy without planning (Muskens et al., 2022). Lack of pregnancy planning is also caused by several factors including low knowledge about pregnancy, having given birth, drug addiction, and lack of support (Goossens et al., 2016).

Studies in Brazil state that pregnant women who do not plan pregnancy well increase depression 2.5 times at the time of pregnancy and birth than mothers who plan pregnancy (Faisal-Cury et al., 2017). A meta-analysis of 18 cross-sectional articles with a population of pregnant women showed that low pregnancy planning increases depression. Pregnant women who did not plan a pregnancy were 1.89 times more likely to experience depression compared to mothers whose pregnancies were planned. And the results were statistically significant (aOR= 1.89; CI 95%= 1.56 to 2.30; p< 0.001).

Longitudinal studies examining depression up to the time of birth suggest that mothers whose unplanned pregnancies increase depressive symptoms even after she gives birth (Muskens et al., 2022). The rate of unplanned pregnancies is high in America at 45% (Finer and Zolna, 2016). This could be due to cultural factors where it is often found that the culture of not having children is related to using contraception.

2. The effect of complications on depression of pregnant women

As many as 5% to 13% of pregnancies experience complications such as premature birth, bleeding, hypertension and others that endanger the mother and fetus (Kang-Yi et al., 2018). Complications can affect the feelings of pregnant women so that it interferes with the mother's psychosocial which is one of the causes of depression (Duko et al., 2019). Fear of maternal health and fear if the fetus is affected by complications suffered by the mother increase the possibility of experiencing depression.

A meta-analysis of 18 cross-sectional articles with a population of pregnant women showed that complications would influence depression. Mothers who experienced complications were 2.00 times more likely to develop depression than those without complications and the increase was statistically significant (aOR= 2.00; CI 95%= 1.72 to 2.32; p= 0.001)

Basically, depression itself is the result of complications. This limits the mother's activities so that pregnant women do not do what they like, causing feelings of fear and despair about what the mother is carrying (Ishtiaque et al., 2020). The existence of complications makes stress and becomes a psychological burden for pregnant women. Pregnant women who have complications will experience depression 2.57 times compared to not having complications (Ayele et al., 2016).

3. The effect of social support on depression in pregnant women

Most researchers observed that the main source of support came from the husbands and other female family members, along with the growing importance of the husband's role in recent years (Schauer et al., 2023). Many challenges related to conjugal relationships are mentioned as risk factors

for depressive symptoms, including infidelity, substance use disorders, heavy workloads, disrespect in decision-making, or even domestic violence. Poor social support is a major predictor of mental health problems and strong social support supports important protection for pregnant women (Whitworth et al., 2023).

Strong social support has been shown to be able to contain depression. When a pregnant woman is transitioning into motherhood, she relies on the social support surrounding her. Perceived social support may be a more reliable and valid measure of social support than available support and perceived weak partner support was found to be associated with antenatal anxiety and depression (Lewis-Jones et al., 2023). Symptoms. The conceptualization of social support networks can be difficult to assess, as they can be defined too broadly or too narrowly or as just one type of support, and families or couples may not even be involved. When conducting an assessment of the relationship with perinatal distress, social support from the partner (Brent et al., 2011).

AUTHOR CONTRIBUTION

Sultonnur Rosid as the main researcher who chose the research topic, conducted a search for data collection in this study. Dhafi Alwan Umar and Gilang Pamungkas Ardi Putra conducted data analysis and reviewed study documents.

FUNDING AND SPONSHORSHIP

This study is self-funded.

CONFLICT OF INTEREST

There is no conflict of interest in this study.

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