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Meta-Analysis
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A Meta-Analysis of Gender, Marital Status, and Residence on Condom Use Among Adults

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ABSTRACT

Background: The use of condoms is the only method of contraception that can protect a person from sexually transmitted diseases (STDs). This study aims to analyze and estimate the effect of gender, marital status and residence on condom use among adults.
Subjects and Method: The systematic review and meta-analysis studies were conducted according to the PRISMA flowchart and PICO model. Population: Adults in general. Intervention: Gender (Female), Place of Residence (Rural) and Marital Status (Unmarried) in using condoms. Comparison: gender (male), place of residence (urban), and marital status (married). Outcome: condom use. The basic data used involves Google Scholar, PubMed, BMC, Scient Direct, and Springer Link with the keywords ("Use condom") AND ("Gender") AND ("Marital status") AND ("Adult") AND ("Cross -sectional"). Inclusion criteria were cross-sectional study articles in English published from 2014 to 2024. Data analysis was carried out using the Review Manager 5.3 application.
Results: This meta-analysis included 14 cross-sectional studies from Ethiopia, Iran, Africa, and America. The sample size in this meta-analysis was 18,322. Meta-analysis showed that condom use was less in women (aOR= 0.66; 95% CI= 1.20 to 0.36; p 0.170), and more in rural areas (aOR= 0.80; 95% CI= 0.66 to 0.98; p= 0.620), with unmarried status (aOR = 0.92 CI 95%= 1.97 to 0.43; p 0.830). However, these three results were not statistically significant.
Conclusion: : Condom use is less among women and more in rural areas with unmarried status.

Keywords: Adult, gender, marital status, use condom, cross-sectional

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BACKGROUND

According to the World Health Organization (WHO), sexually transmitted diseases (STDs) have a significant impact on sexual and reproductive health (WHO, 2016). Sexually transmitted diseases (STDs) can occur through unprotected sexual intercourse with an infected sexual partner. Global data on this matter shows an increasing trend, early adulthood is a

developmental period that lasts 18-29 years (Bae et al., 2015). According to WHO, condom use has a significant impact, marked by an increase in condom use since 1990 which has prevented around 117 million new HIV infections. The majority of STDs can be prevented by proper use of condoms with 98% of women whose male partners use condoms correctly in every sexual intercourse for one year will be protected from unplanned pregnancy and when female condoms are used, 95% of them will be protected from unplanned pregnancy (Stover et al., 2022).

A person's behavior toward condom use assesses general interpersonal concerns rather than partner-based interpersonal concerns. This lack of clarity weakens a person's ability to predict condom use, because individuals who have multiple partners have a higher risk of contracting disease, and also have a higher risk of contracting STDs, therefore, it is very important to understand the factors that predict condom use in adults (Elshiekh et al., 2020). The use of condoms in adulthood can be influenced by various factors, of which there are three factors that can be used as benchmarks, namely gender, residence and marital status.

The first factor is gender which can influence an individual's consistency in using condoms. Research shows that condom use is influenced by various factors, including gender. A study in Ethiopia found that female respondents were 0.92 times less likely to use condoms consistently than male (aOR=0.92, 95% CI= 0.64 to 1.83) (Ali et al., 2019). The most important explanatory factor in this study may be the gender power difference in condom use between male and female participants. In addition, the gender gap in negotiating condom use may explain differences in the reported frequency of condom use between men and women (Njau et al., 2013).

The second factor is residence, which means the region that describes the availability of health service facilities and personnel. Several studies show the influence of residence on consistent use of condoms by sexual partners (Ali et al., 2019). For example, research conducted in Uganda shows that area of residence has a statistically significant relationship with condom use (Tumwesigye et al., 2017).

The third factor is marital status which has the greatest influence on condom use, because condom use is the method of choice for single men and women who are sexually active. This is said, that someone who is married will use condoms less often than those who are not married, because those who are married tend to look after each other by paying more attention to health in relationships to obtain healthy offspring, whereas someone who is not married tends to use a condom to protect his/her status from other people and avoid contracting disease (Dube et al. 2017).

Based on these factors, it can be said that condom use in adulthood is determined by various factors which need to be considered and evaluated and it is hoped that the authors can estimate the influence of gender, residence and marital status on condom use in adult. This study aims to analyze and estimate the influence of gender, marital status and residence on condom use in adults.

SUBJECTS AND METHOD

1. Study Design

This study was a systematic and meta-analysis guided by the PRISMA flow diagram. The database was used from a systematic and comprehensive electronic database from several indexing and hand

searching, including: Pubmed, Science Direct, Google Scholar, and Springer Link. By using the keywords ("Use condom") AND ("Gender") AND ("Marital status") AND ("Adult") AND ("Cross-sectional"). The article search was carried out by considering the eligibility criteria defined using the PICO model (Population (adults), Intervention (women, unmarried and rural), Controls/ Comparisons (men, married and urban), Outcome (condom use). There were 14 primary studies that met the inclusion criteria in this study.

2. Steps of Meta-Analysis

1) Create a research question using the PICO format, which involves defining Population, Intervention, Comparison, and Outcome.
2) Search for primary article reviews from various electronic and non-electronic databases.
3) Screening of articles with Critical Appraisal assessment of primary research
4) Perform data extraction and estimate synthetic effect sizes using RevMan 5.3.
5) Interpret and conclude research results.

3. Inclusion Criteria

The inclusion criteria used in this study were articles with cross-sectional studies, using multivariate analysis with research results using adjusted odds ratio (aOR), and published in English from 2014 to 2024. The research subjects were adults.

4. Exclusion Criteria

The exclusion criteria in this study were RCT studies (randomized controlled trials), quasi-experiments, research protocols, non-full text articles, non-English articles, and articles carried out only through bivariate analysis.

5. Definition of Operational Variable

The Use of Condom is a contraceptive method made from latex rubber and is used to protect a person from sexually transmitted diseases (STDs).

Gender is the physical differences, characteristics and biological functions between women and men which determine different roles in carrying out efforts to continue the lineage.

Residence is a place that is used as a place occupied or inhabited by individuals, families or groups.

Marital Status is a status that has been and is determined or at the time of the census that is legally recorded, this status can be single, married, widowed, divorced, separated.

6. Study Instrument

Primary studies were screened by critical appraisal to determine eligibility. The assessment instrument used Critical Appraisal Cross-sectional Study for Meta-Analysis Research published by the Masters' Program of Public Health, Sebelas Maret University, Surakarta (2023).

7. Data Analysis

The research that has been collected was selected using predetermined criteria. This research is a meta-analysis study. Data processing uses Review Manager (RevMan. 5.3). This study used effect size on research results. This study refer to the effect size and heterogeneity values to determine the model for combining research and forming the final results in the form of a forest plot and funnel plot.

RESULTS

The search process related to the effect of gender, marital status and residence on Condom use. In this study, data collection was carried out using 4 online databases and the results obtained were 14 articles, according to the PRISMA diagram in Figure 1.

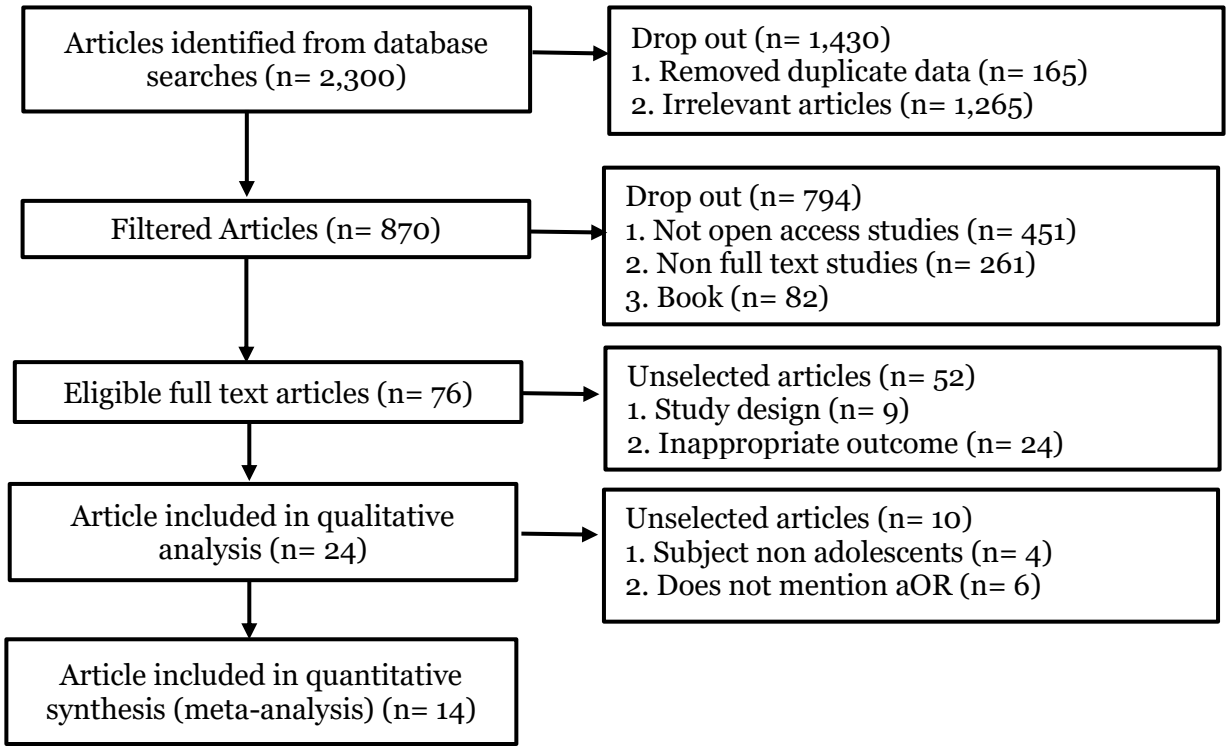

Figure 1. PRISMA diagram of the influence of gender, residence, and marital status on condom use in adulthood

Figure 2. Map of research locations used in meta-analysis

Figure 2 explains the article distribution map. This study obtained 11 articles from various countries. There is 1 article from America, 2 articles from the Asian continent, including 1 article from China, 1 article from Iran, and 11 articles from the African continent, including 10 articles from Ethiopia and 1 article from Kenya. The article distribution map was used for identifying the distribution of article

publication locations to see the level of heterogeneity of the samples studied.

Table 1. Critical Appraisal for cross-sectional study in meta-analysis

Primary Study	Criteria													Total
	1a	1b	1c	1d	2a	2b	3a	3b	4	5	6a	6b	7	
Abera et al. (2017)	2	2	2	2	0	2	2	2	1	2	2	2	2	23
Ahmed et al. (2020)	2	2	2	2	0	2	2	2	2	2	2	2	2	24
Ajayi et al. (2019)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Ali et al. (2019)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Armoon et al (2023)	2	2	2	2	0	2	2	2	2	2	2	2	1	23
Ayele et al. (2021)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Gebresilassi et al. (2023)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Gelibo et al. (2015)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Liu et al. (2023)	2	2	2	2	2	2	2	2	1	2	0	2	2	23
Shamu et al. (2020)	2	2	2	2	2	2	2	2	1	2	0	2	2	23
Tesfaye et al. (2020)	2	2	2	2	0	2	2	2	1	2	2	2	2	23
Yosef et al. (2020[b])	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Yosef et al. (2020[b])	2	2	2	2	2	2	2	2	2	2	2	2	2	26

Questions Criteria:

1. Formulation of research questions in the acronym of PICO

a. Is the population in the primary study the same as the population in the PICO of meta-analysis?

b. Is the operational definition of intervention, namely the exposed status in the primary study, the same as the definition intended in the meta-analysis?

c. Is the comparison, namely the unexposed status used by the primary study, the same as the definition intended in the meta-analysis?

2. Are the outcome variables examined in the primary studies the same as the definitions intended in the meta-analysis?

3. Methods for selecting research subjects

a. In analytical cross-sectional studies, do researchers choose samples from the population randomly (random sampling)?

b. As an alternative, if in a cross-sectional analytical study the sample is not selected randomly, does the researcher select the sample based on outcome status or based on intervention status?

4. Methods for measuring exposure (intervention) and outcome variables (outcome)

a. Are the exposure and outcome variables measured with the same instruments (measuring tools) in all primary studies?

b. If the variable is measured on a categorical scale, are the cutoffs or categories used the same across primary studies?

5. Design-related bias

If the sample was not selected randomly, has the researcher made efforts to prevent bias in selecting research subjects? For example, selecting subjects based on outcome status is not affected by exposure status (intervention), or selecting subjects based on exposure status (intervention) is not affected by outcome status.

6. Methods to control confusion (confounding)

Have primary study researchers made efforts to control the influence of confounding? (for example, performing a

multivariate analysis to control for the influence of a number of confounding factors)

7. Statistical analysis methods

a. Do the researchers analyze the data in this primary study by using a multivariate nalysis model? (e.g., multiple linear regression analysis, multiple logistic regression analysis)
b. Does the primary study report effect sizes or associations resulting from the multivariate analysis? (e.g., adjusted OR, adjusted regression coefficient)

8. Conflict of interest

Is there no possibility of a conflict of interest with the research sponsor, which could cause bias in concluding the research results?

Question Score:

0 = No
1= Uncertain
2 = Yes

Table 2 is an overview of 14 articles with cross-sectional studies selected based on predetermined criteria. The total sample was 18,322 adults over 18 years old from China, Iran, Ethiopia, Kenya and America. The articles used in this research were articles published from 2015 to 2023.

Table 2. PICO Cross-sectional article about the influence of gender, residence, marital status on condom use in adulthood with sample size (n=18,322)

Author (Year)	Country	Sample	P Population	I Intervention	C Comparison	O Outcome
Ahmed et al. (2020)	Ethiopia	6787	Adult 15-24 years old	Rural	Urban	Using Condom
Ali et al. (2019)	Ethiopia	394	Adult≤19 years old	Rural	Urban	Using Condom
Ayele et al. (2021)	Ethiopia	401	Adult 18-35 years old	Rural	Urban	Using Condom
Tesfaye et al. (2020)	Ethiopia	358	Adult≤19 years old	Rural, Female	Urban, male	Using Condom
Gebresilassie et al. (2023)	Ethiopia	273	Adult 19-22 years old	Rural, Unmarried	Urban, Married	Using Condom
Yosef et al. (2020[a])	Ethiopia	453	Adult ≥ 18 years old	Rural, Female	Urban, male	Using Condom
Yosef et al. (2020[b])	Ethiopia	453	Adult ≥ 18 years old	Female, Unmarried	Male, Married	Using Condom
Abera et al. (2017)	Ethiopia	492	Adult 15-24 years old	Female, Unmarried	Male, Married	Using Condom
Ajayi et al. (2019)	Nigeria	498	Adult ≥ 17 years old	Female	Male	Using Condom
Armoon et al. (2022)	Iran	272	Adult ≥ 18 years old	Female, Unmarried	Male, Married	Using Condom
Gelibo et al. (2015)	Ethiopia	770	Adult 18-35 years old	Female	Male	Using Condom
Liu et al. (2023)	China	1,335	Adult≤19 years old	Female	Male	Using Condom
Shamu et al. (2020)	Africa	1,955	Adult 19-22 years old	Female	Male	Using Condom

Table 3. Data on adjusted odds ratio (aOR) and 95% confidence interval (CI95%) on the influence of residence on condom use

Author (Year)	aOR	CI 95%	
		Upper Limit	Lower Limit
Ahmed et al. (2020)	-0.38	1.03	0.45
Ali et al. (2019)	-1.13	1.02	0.10
Ayele et al. (2021)	0.16	1.99	0.70
Tesfaye et al. (2020)	-1.26	0.55	0.14
Gebresilassie et al. (2023)	-0.73	1.66	0.14
Yosef et al. (2020[a])	-0.78	0.68	0.30
Yosef et al. (2020[b])	0.73	3.29	1.47

The Forest Plot in Figure 3 shows the influence of residence on condom use. Respondents who live in rural areas have a lower probability of using condoms than respondents who live in cities who have a risk of using condoms by 0.66 times higher compared to those who live in villages, but the results of this risk reduction are not statistically significant (aOR= 0.66; CI 95% = 1.20 to 0.36; p= 0.170). The forest plot also shows high heterogeneity in effect estimates between studies (I2=87%). Thus, the average effect estimation calculation was carried out using a random effect model approach.

Figure 4 presents a funnel plot of the influence of place of residence on condom use. The funnel plot shows that effect estimates are more or less symmetrical between studies, more distributed on the right than on the left of the vertical line of average effect estimates. Thus, the funnel plot indicates the existence of publication bias, so the publication bias tends to reduce the true effect (under estimates).

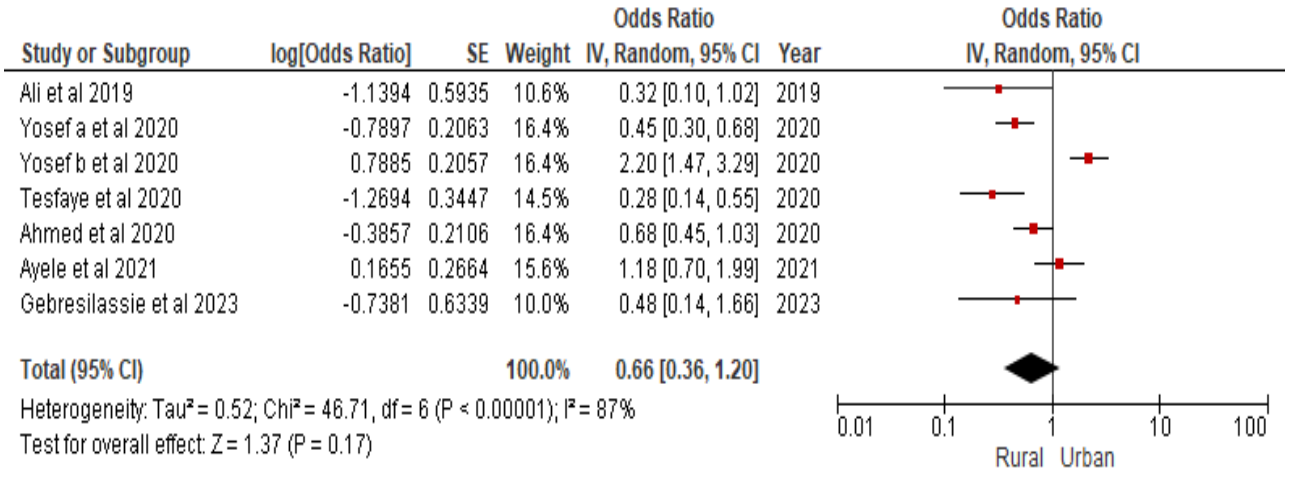

Figure 3. Forest plot of the effect of residence on condom use

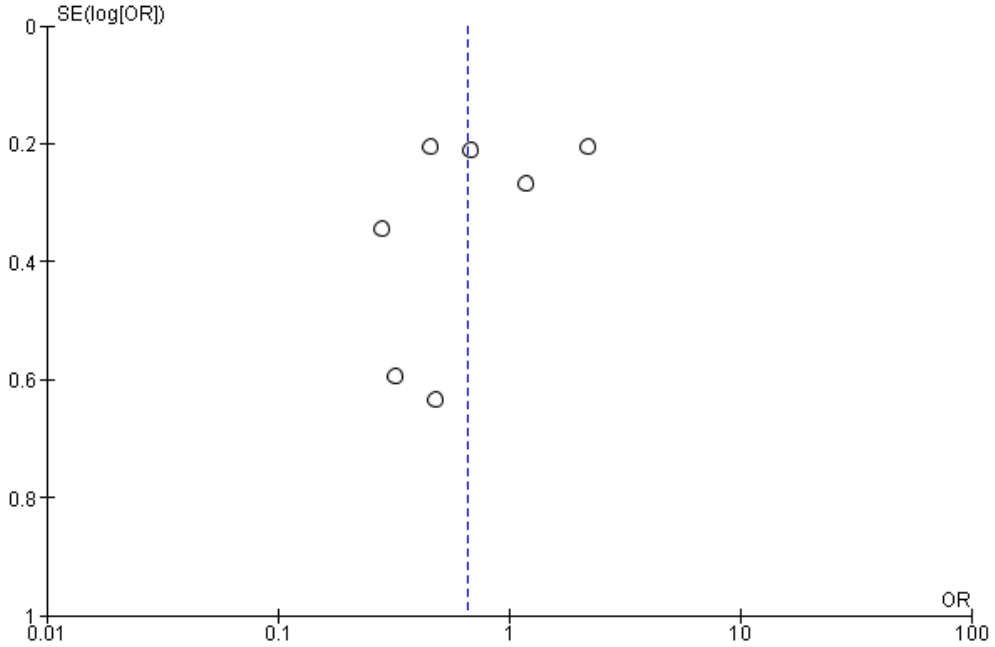

Figure 4. Funnel plot of the effect of residence on condom use

Table 5. Data on adjusted odds ratio (aOR) and 95% confidence interval (95%CI) on the effect of gender on condom use

Author (Year)	aOR	CI 95%	
		Upper Limit	Lower Limit
Abera et al. (2017)	-0.67	0.78	0.33
Ajayi et al. (2019)	-0.42	0.99	0.43
Armoon et al. (2022)	-0.29	9.09	0.06
Gelibo et al. (2015)	1.20	15.56	0.71
Liu et al. (2023)	0.24	3.34	0.49
Shamu et al. (2020)	-0.35	0.91	0.54
Tesfaye et al. (2020)	1.43	7.42	2.39
Yosef et al. (2020[a])	-0.57	0.84	0.38
Yosef et al. (2020[b])	-0.57	0.84	0.38

The Forest Plot in Figure 5 shows the effect of gender on condom use. Female respondents had a lower likelihood of using condoms than male respondents, but this difference was not statistically significant (aOR = 0.90; 95% CI= 1.38 to 0.58; p= 0.620). The Forest Plot also shows high heterogeneity of effect estimates between studies (I2= 83%). Thus, the average effect estimation calculation was carried out using a random effect model approach.

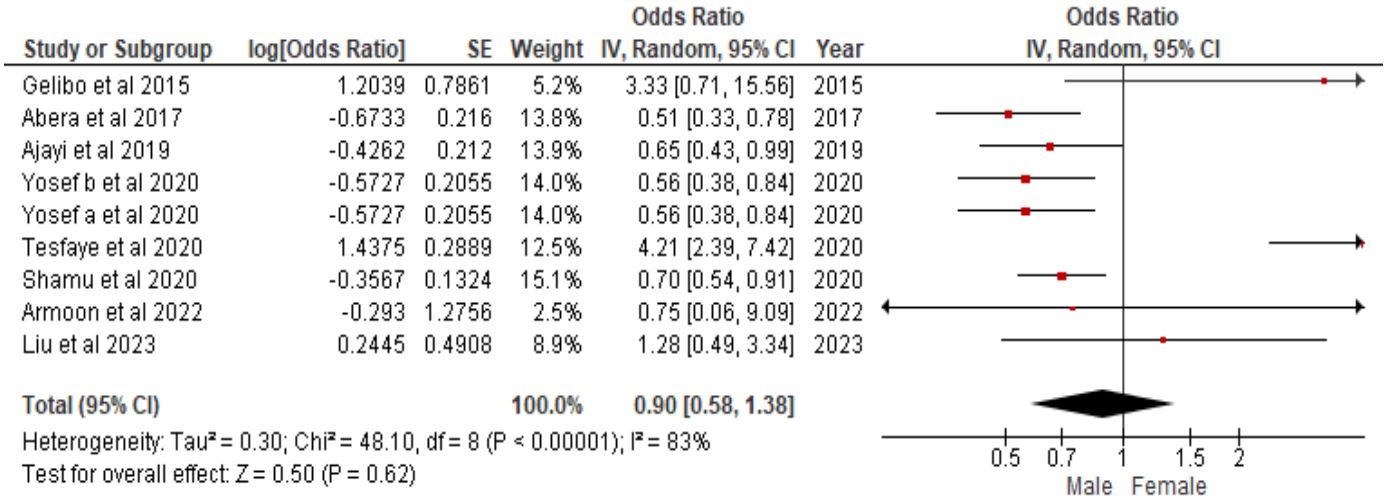

Figure 5. Forest plot of the effect of gender on condom use

Figure 6 presents a funnel plot of the influence of gender on condom use. The funnel plot shows that effect estimates are more or less symmetrical between studies, more distributed on the right than on the left in the vertical line of the average effect estimate. Thus, the funnel plot indicates the existence of publication bias, so the publication bias tends to reduce the true effect (under estimates).

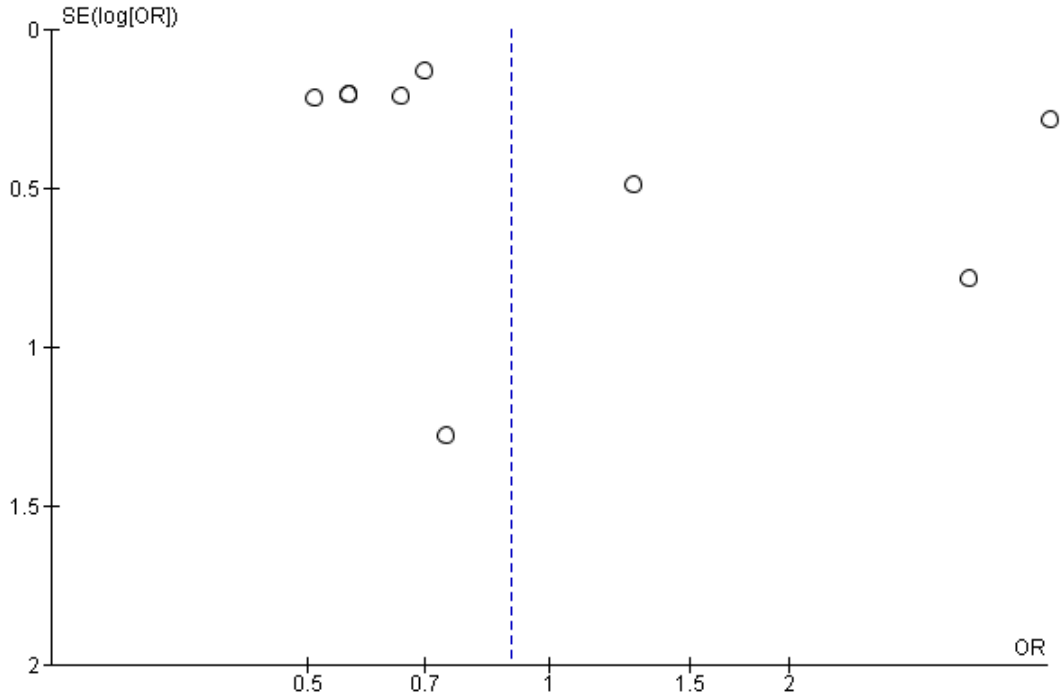

Figure 6. Funnel plot of the effect of gender on condom use

Table 7. Data on adjusted odds ratio (aOR) and 95% confidence interval (CI95%) on the influence of marital status on condom use

Author (Year)	aOR	CI 95%	
		Upper Limit	Lower Limit
Abera et al. (2017)	-0.88	0.71	0.24
Armoon et al. (2022)	-0.69	0.96	0.26
Gebresilassie et al. (2023)	1.77	20.75	1.67
Yosef et al. (2020[a])	-0.53	1.22	0.28
Yosef et al. (2020[b])	0.53	3.52	0.82

The Forest Plot in Figure 7 shows the influence of marital status on condom use. respondents who are unmarried have a lower probability of using condoms than respondents who are married, but this difference is not statistically significant (aOR = 0.92 CI 95%= 1.97 to 0.43; p= 0.830). The forest plot also shows high heterogeneity of effect estimates between studies (I2=81%). Thus, the average effect estimation calculation was carried out using a random effect model approach.

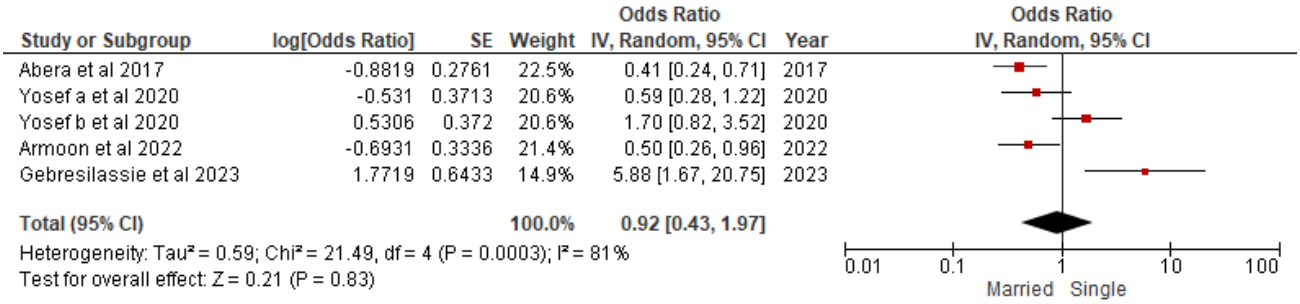

Figure 7. Forest plot of the effect of marital status on condom use

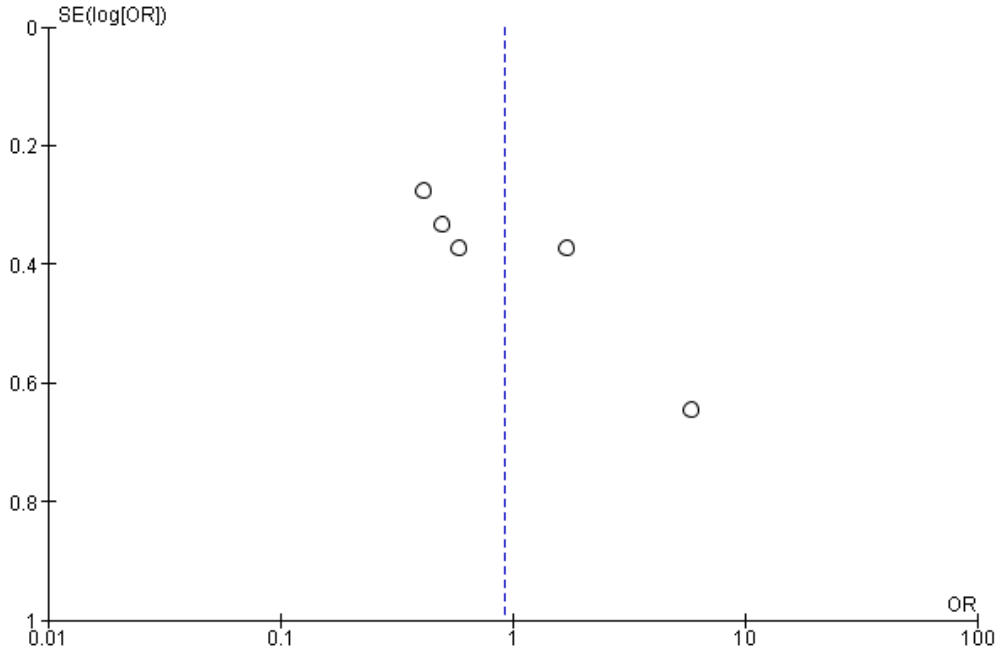

Figure 8. Funnel plot of the effect of marital status on condom use

Figure 8 presents a funnel plot regarding the influence of gender on condom use. The funnel plot shows that effect estimates are more or less symmetrical between studies, more distributed on the right than on the left in the vertical line of the average effect estimate. Thus, the funnel plot indicates the existence of publication bias, so the publication bias tends to reduce the true effect (under estimates).

DISCUSSION

1. The effect of residence on condom use in adult

In general, there is more information and adequate health facilities available in urban areas compared to rural areas. Thus, access to condoms is limited and the existence of social barriers such as embarrassment about buying condoms can be a factor in the low use of condoms in rural areas (Gabresilassie et al. 2013). In the meta-analysis results of the 7 articles used, it was shown that those who live in urban areas are 0.66 times less likely to influence the use of condoms than those who live in rural areas (aOR= 0.66; 95% CI= 1.20 to 0.36; p= 0.170). This research is in line with research by Jimu et al. (2023) who said that those living in rural areas were greater than those from urban areas (aOR= 0.74; 95% CI= 0.61 to 0.90). Showing that the area of residence has a statistically significant relationship with the use of condoms during sexual relations is probably due to the fact that among those who have taken an HIV test the reason is to avoid contracting the virus, so it has implications for the development of policies and programs regarding condom use. Intensifying HIV testing among the general public can encourage safe sex practices thereby preventing STIs including HIV and unplanned pregnancies. In addition, education needs to be emphasized for the entire general public to empower them to make the right decisions regarding condom use.

2. The effect of gender on condom use in adult

This includes the norms, behavior and roles related to the existence of women and men, as well as their relationships with each other (WHO, 2020). There are 9 articles used from this meta-analysis from several countries to measure the influence of gender on condom use. The article uses a cross-sectional study design. This research shows a strong relationship between male and condom use. Data shows that men who use condoms have a 0.90 greater risk of using condoms than women (aOR = 0.90; 95% CI= 1.38 to 0.58; p= 0.620). This research is in line with research conducted in Addis Ababa, Ethiopia (Geleta et al., 2020) which shows that male respondents are 2.02 times more likely to use condoms than female respondents (aOR= 2.02; 95% CI = 1.34 to 3.05).

On the other hand, it is due to the fact that there are gender differences which cause women to have lack of self-confidence and tend not to use condoms consistently, have less power to negotiate the use of condoms and have less ability to decide on sexual life, especially in developing countries (Fladseth et. al, 2015). Norms and gender that prioritize men and disadvantage women create gender inequality, which can lead to risky sexual behavior. This further strengthens the belief that differences in norms and gender influence a person's barriers to use condoms (Cislaghi, 2020). So that gender inequality will have an impact on sexual and reproductive health in both the short and long term (Bandiera et al., 2018).

3. The effect of marital status on condom use in adult

Marital status influences a person's sexual role, it is estimated that someone who is

married has different sexual activities from someone who is not married. A married person will behave healthily and responsibly in having sexual relations with their partner because they do not want the negative impacts of sexual relations Wong et al. (2018). From the results of the meta-analysis of the 5 articles used, it was found that married people were 0.72 times less likely to use condoms than unmarried people (aOR = 0.92 95% CI = 1.97 to 0.43; p = 0.830).

This is in line with research by Geleta and Mesafint (2019), male respondents were 2.02 times more likely to use condoms compared to female respondents (aOR=2.02; 95% CI= 1.34 to 3.05). Married and widowed respondents were respectively 61% and 52% less likely to use condoms compared to single respondents (aOR=0.39; 5% CI= 0.19 to 0.77 and (aOR= 0.48; 95% CI= 0.24 to 0.94). This study shows that consistent condom use is influenced by gender. Male respondents are 2.02 times more likely to use condoms than female respondents. This is due to the fact that women have lack of power to negotiate the use of condoms and also have lack of ability to decide on sexual life, especially in developing countries. Furthermore, respondents who are already married or have previously had a marital status (widower/ widower) are less likely to use condoms compared to those who are single. This is likely caused by the perception that condoms are not needed among married couples, partners' rejection of condoms, the desire to have children, and a lack of women's empowerment.

AUTHOR CONTRIBUTION

Agustin Mahardika Hariyadi, Mentary Febryant Putry and Sita Rahayu Sanusi are the researchers who selected the topics, searched and collected articles, analyzed data and wrote manuscripts. Bhisma Murti helped to analyze data and review research documents.

CONFLICT OF INTEREST

There is no conflict of interest in this study

FUNDING AND SPONSORSHIP

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CONFLICT OF INTEREST

There is no conflict of interest in this study.

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