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Meta-analysis
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The Associations between Attitude and Quitting Smoking in Adult Smokers: A Meta-Analysis

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ABSTRACT

Background: According to the World Health Organization (WHO), by 2025, tobacco control initiatives are expected to reduce the prevalence rate of tobacco throughout the WHO region. Recent assessments of smoking epidemics over the past half-century show a decrease in overall smoking prevalence among adult males (32.2% to 33.1%) and females (6.3% to 6.7%). The effectiveness of all these smoking cessation programs depends on knowing the factors that affect smokers. Factors such as sociodemographic factors, attitudes, and environment play an important role in the desire to quit smoking This study aimed to determine the influence of attitudes on the likelihood of quitting smoking in adults.
Subjects and Method: Systematic review and meta-analysis using prism flow diagrams and PICO format. Population: Adult smokers. Intervention: attitudes of likelihood of quitting smoking, smoking Outcome: Smoking cessation behavior in adults. The online databases used are Google Scholar, BMC, ScienceDirect, and Springer Link with the words smoking cessation, attitude to quit smoking, cross sectional and aOR. There were 9 cross sectional studies published in 2019-2023. The analysis was performed with RevMan 5.3.
Results: This meta-analysis included 9 cross-sectional studies from the Hadiyah Zone, Southern Ethiopia, Bhubaneswar, India, Hanoi, Vietnam, United States, Saudi Arabia, England, Taiwan, Beirut, Lebanon and Qatar. The number of samples is 12,526. Smokers with positive attitudes were 1.28 times more likely to quit smoking than negative attitudes, and the effect was statistically significant (aOR= 1.28; CI 95%= 0.84 to 1.95; p= 0.260).
Conclusion: Positive attitudes increase the likelihood of smokers quitting smoking.

Keywords: quit smoking, attitudes, smokers, cross sectional, aOR.

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BACKGROUND

According to the World Health Organization (WHO), by 2025, tobacco control initiatives are expected to reduce tobacco prevalence rates across the WHO region. Recent assessments of smoking epidemics

over the past half-century show a decrease in overall smoking prevalence among adult men (32.2% to 33.1%) and women (6.3% to 6.7%) (WHO, 2022). The effectiveness of all these smoking cessation programs depends on knowing the factors that affect smokers. Factors such as sociodemographic, psychological, and environmental factors play an important role in the desire to quit smoking (Monshi et al., 2023). In line with research conducted by Kendrich and Sinaga (2023), the positive attitude in this study reflects a person's willingness to avoid the dangers and habits of smoking. This study shows that most medical students have a positive attitude and found that there is a significant relationship between smoking attitudes and status (Kendrich and Sinaga, 2023).

Previous primary studies have shown multivariate logistic regression analyses showing that tobacco smokers who have heard of SCCs (aOR= 3.; 95% CI= 1.8 to 5), support tobacco tax increases (aOR= 2.3; 95% CI= 1.4 to 3.8; p= 0.25), positively correlate with the desire to quit smoking (Monshi et al., 2023). Then the following is based on research conducted by tamirat (2021) In this study, health workers who received training on smoking cessation interventions were 6.5 times more likely to perform good smoking cessation intervention practices compared to health workers who did not receive training (aOR= 6.5; 95%CI= 2.366 to 11.557) (Temesgen, 2021).

Similar to a study conducted by Huang et al. (2020), the results showed that attitudes towards THPA were a statistically significant factor in smoking cessation among heavy smokers, with a more positive attitude associated with a higher likelihood of quitting the adjusted odds ratio (aOR= 1.80; 95% CI= 1.12 to 2.90; p= 0.25) (Huang et al., 2020). In line with research conducted by Jackson et al. (2020) Our findings are consistent with some previous studies conducted in other countries. For example, data from the International Tobacco Control Project revealed a positive relationship between smoking ban regulations and smoking cessation intentions in Malaysia, Tailand, Canada, the United States, the United Kingdom, and Australia.

Another cross-sectional survey of smokers in Germany showed that the descriptive norm for quitting smoking most people who were important to me had quit smoking were associated with a greater intention to quit. Research by Jackson et al. (2020) suggests that interventions or policies that change smoking norms may be useful in helping to reduce the prevalence of smoking. then found that many people, not even smokers, believe that smoking is a common behavior. Descriptive norms tend to be most strongly associated with behavior but are difficult to change (Jackson et al., 2020). Then according to a study conducted by Chaaya et al. (2019) Related to psychosocial variables, only respondents who had concerns about the influence on their children were likely to report the intention to quit smoking (aOR= 7.38; 95% CI= 2.41 to 22.65; p= 0.042) (Chaaya et al., 2019). The study aimed to estimate the magnitude of the influence of attitude on the likelihood of smokers quitting smoking.

SUBJECTS AND METHOD

1. Study Design

This study is a systematic review and meta-analysis study guided by PRISMA flowcharts. Article searches were collected from Google Scholar, BMC, ScienceDirect, and Springer Link. The keywords used are "smoking cessation" DAN "attitude of quit smoking" AND "cross sectional" AND "aOR". There were 9 primary studies that met the inclusion criteria of this study.

2. Step of Meta-Analysis

The meta-analysis was carried out in five steps as follows:

1) Formulate research questions in the PICO, including: P= Adult smokers; I= negative attitudes; C= positive attitudes; O= Smoking cessation behavior in adults.
2) Search for primary study articles from various electronic and non-electronic databases.
3) Conduct screening and critical assessment of primary research articles.
4) Perform data extraction and synthesize effect estimates into RevMan 5.3.
5) Interpret and conclude the results.

3. Inclusion Criteria

Articles using English with a cross sectional design, published between 2014-2024. The analysis used is multivariate with Adjusted Odds Ratio (aOR). The subject of the study was an adult and the results analyzed were that there was a significant influence of attitude on smoking cessation behavior.

4. Exclusion Criteria

The exclusion criteria in this research are non-English articles, non-full-text articles, and articles published before 2014.

5. Operational Definition of Variables

Behavior is a set of actions or actions of a person in responding to something and then made a habit because of the value that is believed.

Attitude is a tendency to react to a thing, person or thing with likes, dislikes or indifference. Thus, in principle, we can consider this attitude as a tendency of students to act in a certain way. A person's tendency to react or attitude towards something, people or things can thus be three possibilities, namely liking (accepting or liking), disliking (refusing or disliking) and indifference.

Quitting smoking is a person's willingness to avoid the dangers and habits of smoking. The intention to perform behavior is related to knowledge (belief) about the behavior to be carried out and the attitude towards the behavior, as well as the behavior itself as a tangible manifestation of the intention.

6. Instruments

Primary studies that have been screened will undergo a critical assessment or review of the study to determine eligibility. The assessment instrument used the Critical Appraisal Cross-Sectional Study for Meta-analysis Research published by the Master of Public Health, Sebelas Maret University of Surakarta (2023).

7. Data analysis

The search results of the articles were collected with the help of PRISMA diagrams. Lead articles that fit the inclusion criteria were analyzed using the RevMan 5.3 application to calculate the effect size and heterogeneity of the study. The results of data processing were represented (OR, 95% confidence interval, and p-value)using the Mantel-Haenszel method for meta-analysis and presented in the form of forest plots and funnel plots.

RESULTS

The process of searching for articles to be synthesized and the process of reviewing and selecting articles using the PRISMA Flow Diagram are presented in Figure 1. The initial search process resulted in 2,081 articles. After removing articles duplication and irrelevant articles, 762 articles were generated, subsequently, after the process of eliminating article duplication, the next step was to check the relevance of the title and the study design used to generate 65 articles. After checking articles according to inclusion criteria and exclusion criteria 9 full-text articles were included for meta-analysis with the study method on the article being cross-sectional.

Figure 2 showed the observed 16 study articles that come from the Africa, America, Europe, and Asia continents.

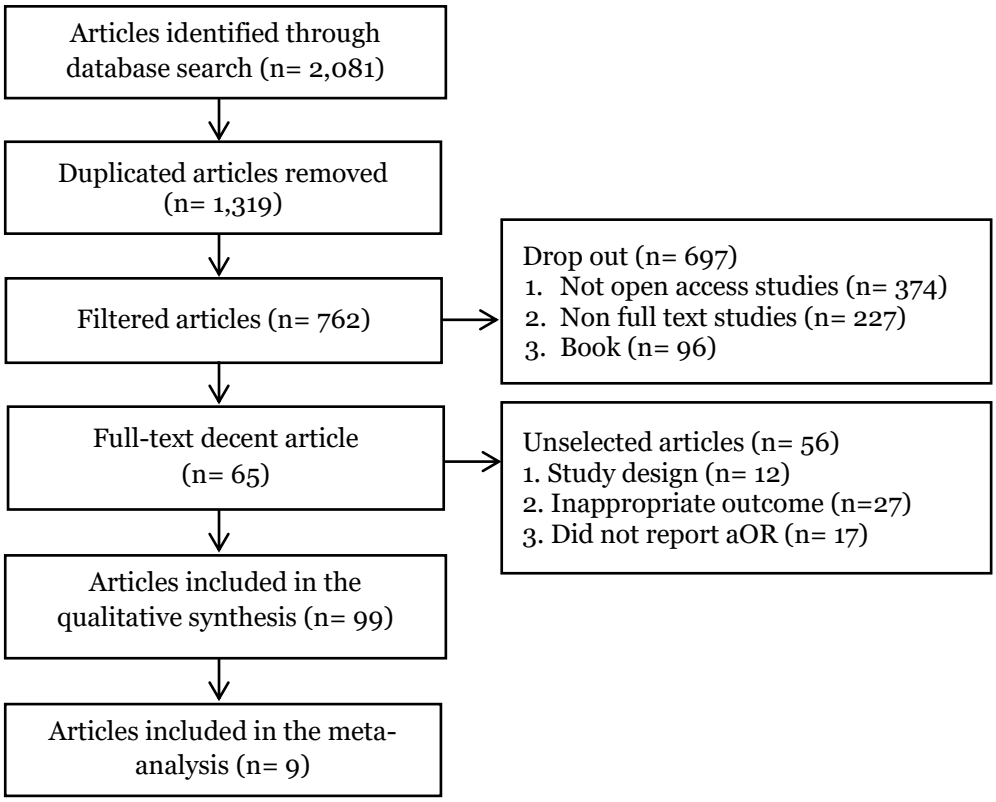

Figure 1. PRISMA Flow diagrams of the influence of attitudes on the possibility of quitting smoking in adults

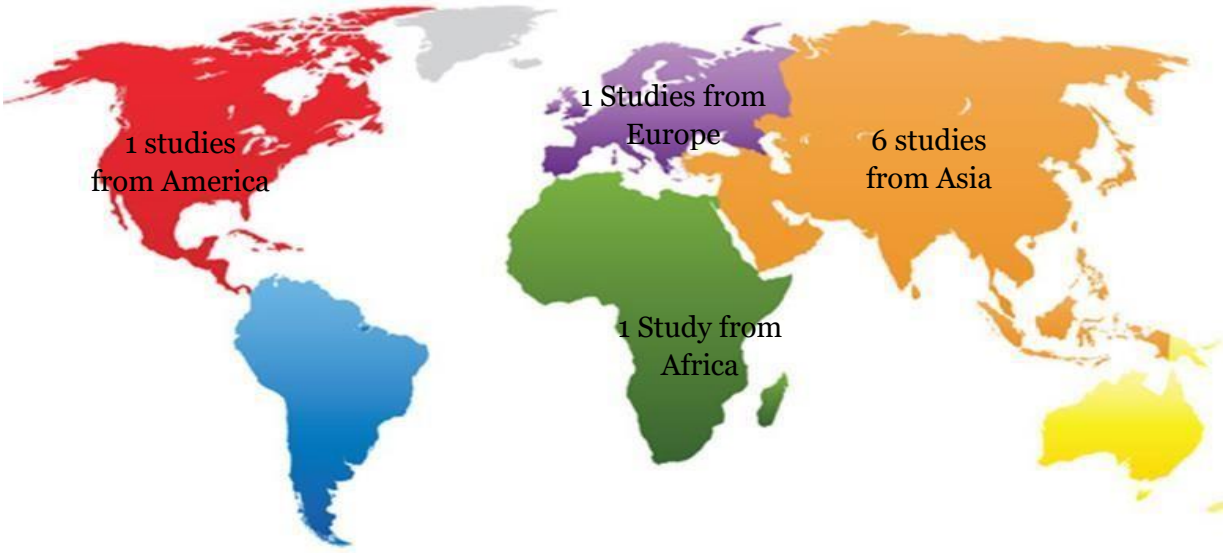

Figure 2. Research distribution map of the influence of attitudes on the possibility of quitting smoking in adults

Table 1. The quality assessment result of the influence of attitudes on the possibility of quitting smoking in adults with a cross-sectional study.

Primary Study	Criteria													Total
	1				2		3		4	5	6		7	
	a	b	c	d	a	b	a	b			a	b		
Tamirat (2021)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Panigrahi et al. (2021)	2	2	2	2	2	2	2	2	2	2	2	1	2	25
Nguyen et al. (2023)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Nagawa et al. (2020)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Monshi et al. (2023)	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Jackson et al. (2020)	1	2	2	2	2	2	2	2	2	2	2	2	2	25
Huang et al. (2021)	2	2	2	2	2	2	2	1	2	2	2	2	2	25
Chaaya et al. (2019)	2	2	2	2	2	2	2	2	1	2	2	2	2	25
Almulla et al. (2021)	2	2	2	2	2	2	2	2	2	2	2	1	2	25

Table 1 showed quality assessment result of articles with a cross-sectional study included in meta-analysis.

Description of the question criteria:

1. Formulation of research questions in PICO acronym:

a. What is the population in the study primary is the same as the population in PICO meta-analysis?

b. What is the operational definition of intervention (intervention), namely the status of exposure (exposed) in primary studies is the same as that definition intended in meta-analysis?

c. What is the comparison (comparison), namely status not exposed (unexposed) is used Primary studies are the same as that definition intended in meta-analysis?

d. What is the outcome variable being studied? in primary studies is the same as that definition intended in meta-analysis?

2. Method for selecting research subjects:

a. Descriptive cross-sectional study (prevalence): Is the sample randomly selected?

b. Analytical cross-sectional study: Are samples randomly or purposively selected?

3. Methods for measuring comparisons (intervention) and outcome variables:

a. Are both exposure or intervention and outcome variables measured with the same instruments in all primary studies?

b. If variables are measured on a categorical scale, are the cut-offs used the same across primary studies?

4. Bias of the design:

a. How much is the response rate?

b. Is non-response related to outcomes?

5. Methods to control confounding:

a. Is there any confusion in the results or conclusions of the primary study?

b. Have primary study researchers used appropriate methods to control the effects of confusion?

6. Method of statistical analysis:

a. In the cross-sectional study, is multivariate analysis performed?

b. Multivariate analysis includes multiple linear regression analysis, multiple logistic regression analysis, Cox regression analysis.

7. Is there a conflict of interest with the research sponsor?

Description of scoring:

0= No; 1= Hesitate; 2= Yes.

Table 2 describes a summary of primary research the influence of attitudes on the possibility of quitting smoking in adults with a cross-sectional design, a meta-analysis was carried out on 9 articles originating from Asia (India, Vietnam, Saudi Arabia, Taiwan Lebanon, and Qatar), America (Unites States), Africa (Ethiopia), and Europe (England). The largest research population was found in a study conducted by Almulla et al. (2021) namely 7,214 adults, and the study with the smallest population, namely the study conducted by Chaaya et al. (2019) as many as 174 adults.

Table 2. Description of the primary studies the influence of attitudes on the possibility of quitting smoking in adults (cross-sectional study).

Author (years)	Country	Sample	P	I	C	O
Tamirat (2021)	Ethiopia	323	Adult health worker	Negative Attitudes to smoking cessation	Positive Attitudes to smoking cessation	Smoking Cessation
Panigrahi et al. (2021)	India	152	Adolesent residing in selected slum area	Awareness/attitude towards the bad effects of smoking	Awareness/Attitude towards the good effects of smoking	Smoking Cessation
Nguyen et al. (2023)	Vietnam	1525	Adult male smokers in Hanoi	Negative attitudes Regarding smoking cessation	Positive Opinions/Attitudes Regarding smoking cessation	Smoking Cessation
Nagawa et al. (2020)	United States	983	Adult age 18 years or older	Negative Attitudes Following Smoking Counseling	Positive Attitudes Following Smoking Counseling	Smoking Cessation
Monshi et al. (2023)	Saudi Arabia	1667	Adult age ≥15	Negative attitude	Positive attitude	Smoking Cessation
Jackson et al. (2020)	England	301	Adult age ≥16	Negative Attitudes to smoking cessation	Positive Attitudes to smoking cessation	Smoking Cessation
Huang et al. (2021)	Taiwan	187	Adult age ≥20	Negative attitudes toward the THPA	Positive attitudes toward the THPA	Smoking Cessation
Chaaya et al. (2019)	Lebanon	174	Adult age 15-65	Negative attitudes of smoking cessation	Positive Attitudes to smoking cessation	Smoking Cessation
Almulla et al. (2021)	Qatar	7214	Adult governmental healthcare workers	Negative attitudes of smoking cessation	Positive Attitudes to smoking cessation	Smoking Cessation

Table 3. aOR and 95% CI data the influence of attitudes on the possibility of quitting smoking in adults.

(Author, year)	aOR	95% CI	
		Lower Limit	Upper Limit
Tamirat (2021)	0.24	0.46	0.12
Panigrahi et al. (2021)	0.92	2.49	2.49
Nguyen et al. (2023)	0.75	1.61	0.35
Nagawa et al. (2020)	2.73	7.38	1.01
Monshi et al. (2023)	2.30	3.78	1.40
Jackson et al. (2020)	1.71	3.18	0.92
Huang et al. (2021)	1.80	2.89	1.12
Chaaya et al. (2019)	3.59	12.27	1.05
Almulla et al. (2021)	1.15	1.33	0.99

Table 3 showed the effect sizes of the primary studies used in the meta-analysis about the influence of attitudes on the possibility of quitting smoking in adults, with largest adjusted odd ratio (aOR) conducted by Nagawa et al. (2020) is 2.73, and the lowest aOR conducted by Tamirat (2021) is 0.24.

Figure 3 presents a forest plot about the influence of attitude on the likelihood of smokers quitting smoking. The Forrest plot showed that smokers with positive attitudes were 1.20 times more likely to quit smoking than negative attitudes, but the effect was statistically insignificant (aOR= 1.28; 95% CI= 0.84 to 1.95; P = 0.260).

The forest plot showed that the estimated effect between studies had a high heterogeneity (I^2= 80%). Thus, the calculation of the average effect estimate is carried out by the random effect model approach.

Figure 4 shows the funnel plot of the influence of attitude on smoking cessation in smokers. The plot funnel shows a symmetrical distribution of effect estimates, so there is no publication bias.

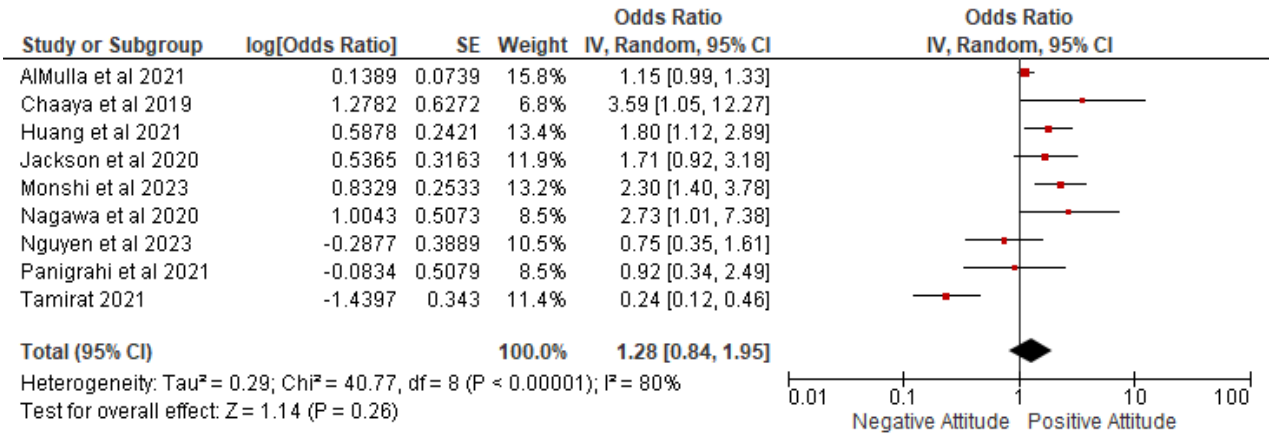

Figure 3. Forest plot the influence of attitudes on the possibility of quitting smoking in adults

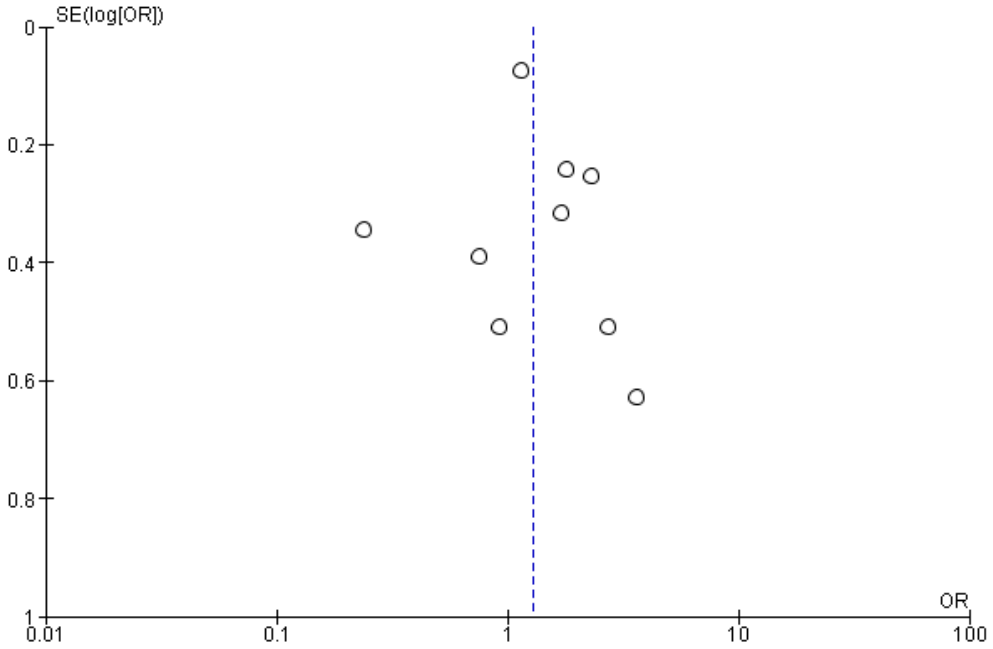

Figure 4. Funnel plot Forest plot the influence of attitudes on the possibility of quitting smoking in adults.

DISCUSSION

Awareness of smokers is needed to choose and sort out good behaviors, especially behaviors that can improve their health. It is necessary to have a positive attitude to quit smoking in order to avoid various diseases caused by cigarettes. The formation of smokers' attitudes is influenced by personal experiences and information from various media (Riyadi & Handayani, 2020).

The primary study used the cross-sectional study design included in this meta-analysis totaling 9 articles showing that smokers with positive attitudes were 1.28 times more likely to quit smoking than negative attitudes, and the effect was statistically significant (aOR= 1.28; 95% CI= 0.84 to 1.95; p= 0.26)

This research is in line with research conducted by Xu et al. (2020) showing that as many as 30.97% of young adult males with higher education tend to have a better understanding of the dangers of smoking for health, and show a more positive attitude towards the dangers of smoking among young adult male smokers.(Xu et al., 2020) In addition, in Brunette et al. (2019) also revealed that a positive attitude in quitting smoking can improve smoking cessation behavior in young people (Brunette et al., 2019).

Another study conducted by Alduraywish et al. (2021) shows that various factors play a role in smokers' knowledge and attitudes in quitting smoking, such as previous attempts to quit smoking, the number of cigarettes used per day, and the level of education. (Alduraywish et al., 2021). Another relevant research is in Riyadi and Sri (2020) showing that the positive attitude of adolescents not to smoke is 69.4% where the more positive adolescents are to behave not smoking, the higher the behavior of not smoking (Riyadi and Handayani, 2020).

Smoking-related factors were used as independent variables to estimate the ratio of unadjusted odds (OR), adjusted OR (aOR) and confidence interval (95% CI). To assess multicollinearity, we calculated Cra-

mer's V or phi statistics to measure the strength of the association between smoking-related variables (74%), 36% aged 55 years and older, and 30% aged between 19 and 34 years. Most had a college education or graduated from college (69%), had used e-cigarettes (78%), and 64% reported the presence of other smokers in their immediate family. Less than half use NRT (47%) or tobacco counseling (21%) to quit smoking (Nagawa et al., 2020).

The majority of participants (74%), 36% were 55 years old and older, and 30% were between 19 and 34 years old. Most had a college education or graduated from college (69%), had used e-cigarettes (78%), and 64% reported the presence of other smokers in their immediate family. Less than half use NRT (47%) or tobacco counseling (21%) to quit smoking (Nagawa et al., 2020). The method and reduction of smoking, namely the amount smoked is done gradually with the same amount up to 0 cigarettes on a set day (Ministry of Health of the Republic of Indonesia, 2017) Based on a survey conducted by the Global Adult Tobacco Survey (GATS) 2021, the number of male smokers is 65.5% (Yuliawati, 2023)

In line with research conducted by Allmulla et al. 2021 They also realized the benefits of providing advice to quit smoking (84.8%) with the consent of Open Access 6 with research conducted among health professionals in Jordan.26 However, 70% of health workers reported that brief interventions were ineffective. It is important for them to provide brief advice as part of their regular consultations to increase the chances of success of smoking cessation efforts (Almulla et al., 2021). Then based on research conducted by Nguyen et al (2023) the factors associated with the intention to quit include a self-reported diagnosis of a chronic disease, having tried quitting before, having more tobacco-related knowledge, having greater self-confidence, worrying about their future health, and feeling the positive effects of health. warning labels and tobacco taxation policies (Nguyen et al., 2023).

This study has several limitations that lie in the limited number of studies that mostly discuss other smoking cessation factors, while the factors regarding smokers' attitudes towards the possibility of quitting smoking among adults are very few and the discussion is not specific. In addition, the limitation in the number of studies that list the number of aOR is still very minimal. Publication bias may occur in the funnel plot, the publication bias tends to overestimate the real effect.

The conclusion of this study is that a positive attitude of smokers has the possibility of quitting smoking even though there are many other supporting factors such as sociodemographic factors, attitudes, and the environment play an important role in the smoker's desire to quit smoking. As stated by Ajzen (2015) in his book, attitude is a desposition to respond positively or negatively to a behavior (Ajzen, 2015).

The implementation in the research that can be carried out is with the existence of various government roles in reducing the number of smokers such as the enactment of smoking bans in public places and more promotions or advertisements that show that cigarettes are detrimental to health and life. In Wang's (2023) research, the smoking cessation process consists of three stages including preparation, intervention, and maintenance (Wang et al., 2023). In addition, in research Kendrich (2023) said that smoking behavior can be reduced or even stopped with the help of trained health workers. Therefore, as a health promoter, it can also play an important role in promoting or socializing about the dangers of cigarettes and various activities that can

improve the quality of health so that the number of active smokers is reduced (Kendrich and Sinaga, 2023).

AUTHOR CONTRIBUTION

Anisah Firdaus and Lestari Indah are researchers who choose topics, search and collect articles, analyze data and write scripts. Bhisma Murti helps analyze data, and Aem Ismail review research documents.

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This study is self-funded.

CONFLICT OF INTEREST

There is no conflict of interest in this study.

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