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Review Article

Effectiveness of Health Promotion Intervention on Smoking Behavior Prevention and Its Impact on Nutritional Status in South Sulawesi Community: A Literature Review

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Abstract

Background: Smoking behavior is one of the leading risk factors for non-communicable diseases and has a significant impact on individual and community nutritional status. In South Sulawesi, the prevalence of active smokers remains high, particularly among the productive age group. Evidence-based health promotion interventions are necessary to reduce this prevalence while simultaneously improving community nutrition.
Aims: This study aimed to analyze the effectiveness of various health promotion intervention approaches in preventing smoking behavior and to evaluate their impact on the nutritional status of communities in South Sulawesi.
Methods: A descriptive-analytical literature review was conducted using articles published between 2016 and 2025 from PubMed, Scopus, ScienceDirect, Google Scholar, and Garuda databases. The selection process followed PRISMA guidelines. A total of 14 studies met the inclusion criteria and were analyzed using thematic synthesis.
Results: A total of 14 studies were included in this review. Most studies reported statistically significant reductions in smoking behavior following interventions such as motivational interviewing, peer education, community-based education, and digital health campaigns. Several studies also demonstrated improvements in nutritional indicators, including dietary diversity, antioxidant intake, and reduced risk of anemia and stunting among vulnerable populations.
Conclusion: Integrated and community participation–based health promotion approaches were associated with significant reductions in smoking behavior and improvements in nutritional status among communities in South Sulawesi.

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INTRODUCTION

Smoking behavior remains one of the most pressing public health issues in Indonesia. The 2023 Basic Health Research (Riskesdas) data recorded a prevalence of active smokers reaching 29.3% of the total adult population in Indonesia, with South Sulawesi being one of the provinces where the figure remains considerably high. This phenomenon not only directly affects respiratory and cardiovascular health but also has a close relationship with community nutritional status [1,2].

The relationship between smoking behavior and nutritional status has been demonstrated in numerous studies. Cigarettes contain more than 4,000 harmful chemical compounds that can interfere with the absorption and metabolism of essential nutrients such as vitamin C, vitamin E, beta-carotene, and several important minerals. Furthermore, nicotine is known to affect appetite regulation and food consumption patterns, resulting in active smokers tending to have poorer nutritional intake compared to non-smokers [3,4].

In South Sulawesi, nutritional problems remain a serious challenge. The prevalence of stunting in children under five in several districts still exceeds the national average, while micronutrient deficiencies such as anemia in pregnant women and school-aged children are also still relatively high. This condition is exacerbated by the high prevalence of smokers among household heads, which affects the allocation of family expenditure for nutritious food [5,6].

Various health promotion intervention efforts have been undertaken to address smoking behavior, ranging from individual approaches such as motivational interviewing counseling to community-based approaches such as social media campaigns and school-based education programs. However, the effectiveness of these various approaches in the context of South Sulawesi communities and their impact on improving nutritional status has not been comprehensively reviewed [7,8].

Therefore, this literature review was conducted to evaluate the effectiveness of health promotion interventions in preventing smoking behavior and their impact on the nutritional status of communities in South Sulawesi. The findings of this review are expected to provide evidence-based recommendations for regional health policymakers.

METHODS

Study Design

This study employed a literature review design using a descriptive-analytical approach. The primary objective was to collect, evaluate, and synthesize empirical evidence regarding the effectiveness of health promotion interventions in preventing smoking behavior and their impact on nutritional status in South Sulawesi communities.

Data Sources and Search Strategy

A systematic literature search was conducted in PubMed, Scopus, ScienceDirect, Google Scholar, and Garuda databases for studies published between 2016 and 2025. The search strategy combined keywords and Boolean operators as follows:

("health promotion" OR "health education") AND ("smoking prevention" OR "smoking cessation") AND ("nutritional status" OR nutrition) AND ("South Sulawesi" OR Indonesia)

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The search yielded 67 records, consisting of 18 articles from PubMed, 12 from Scopus, 15 from ScienceDirect, 16 from Google Scholar, and 6 from Garuda.

Study Selection Process

The study selection process followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to ensure transparency and reproducibility. Articles were screened in three stages: title screening, abstract review, and full-text assessment. Inclusion criteria were defined as follows: (1) articles published between 2016 and 2025; (2) studies using health promotion interventions as the primary independent variable; (3) studies focusing on smoking behavior and/or nutritional status; (4) empirical studies reporting measurable outcomes; and (5) publications in English or Indonesian.

Exclusion criteria included: (1) conceptual papers without empirical data; (2) studies not relevant to the research objectives; (3) dissertations, theses, or conference abstracts without full text; and (4) studies conducted outside the Indonesian or Southeast Asian context without comparative relevance.

After duplicate removal, 50 articles remained for title and abstract screening. A total of 30 articles were excluded due to irrelevance to the study objectives, conceptual nature, or lack of empirical data. Twenty-four full-text articles were further assessed for eligibility, and 10 studies were excluded because they did not meet the inclusion criteria, including studies conducted outside the Southeast Asian context and studies published outside the selected publication period. Finally, 14 studies were included in the thematic synthesis.

Data Extraction and Analysis

Data from the selected studies were systematically extracted using a standardized framework, including author(s), publication year, country of study, population, intervention characteristics, outcome variables, and evaluation methods. A thematic synthesis approach was applied to analyze the findings. Outcomes were categorized into four main domains: (1) knowledge and attitudes toward smoking, (2) smoking behavior, (3) nutritional status, and (4) smoking-related nutritional factors.

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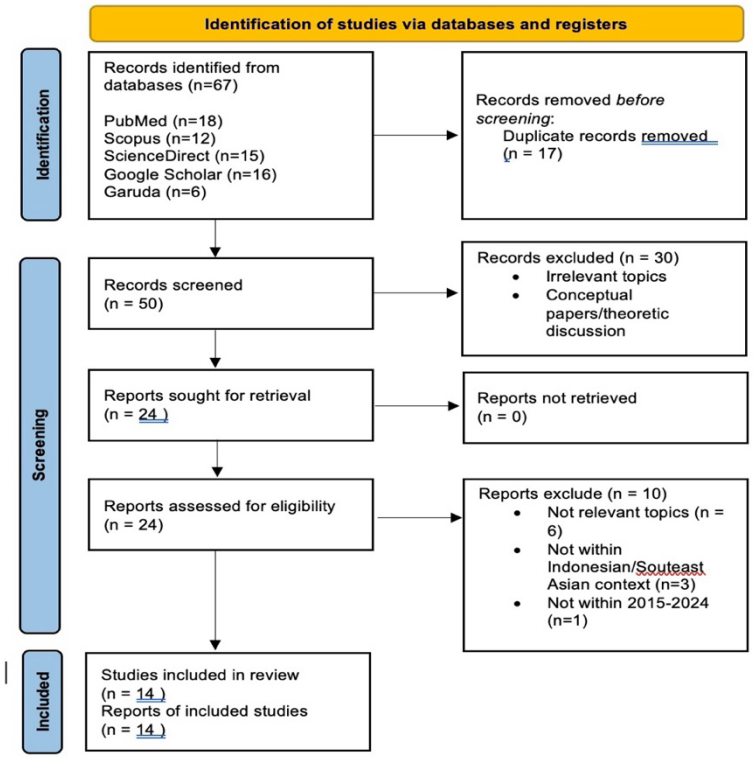

Figure 1. PRISMA flow diagram of the literature search and study selection process.

Quality Assessment

Methodological quality assessment was conducted using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist according to study design. Two independent reviewers assessed study quality and resolved disagreements through discussion. Studies with major methodological limitations were excluded from the final synthesis.

RESULTS

The literature search yielded a total of 14 studies that met the predefined inclusion criteria after a systematic screening process. The included studies were conducted across various regions of Indonesia, with the majority focusing on Eastern Indonesia including South Sulawesi, as well as several comparative studies from Southeast Asian countries with similar demographic and nutritional profiles.

Although several included studies were conducted outside South Sulawesi, these studies were included because they addressed sociocultural and nutritional contexts comparable to Indonesian communities, particularly in Eastern Indonesia.The majority of selected studies employed quasi-experimental, randomized controlled trial (RCT), and mixed-method designs. Interventions examined included motivational interviewing, community-based group education, digital and social media campaigns, and school-based and workplace health promotion programs.

In terms of behavioral outcomes, several studies reported statistically significant reductions in smoking intention, cigarette consumption, and smoking initiation following health promotion interventions ($p < 0.05$). Motivational interviewing and peer education approaches

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were particularly effective in improving participants' knowledge regarding the health risks of smoking and increasing motivation to quit smoking among adolescents and adult smokers [9,10].

Furthermore, interventions based on digital media campaigns and community-based education demonstrated improvements in self-efficacy related to smoking cessation. Participants reported greater confidence in resisting peer pressure to smoke, reducing daily cigarette consumption, and maintaining smoke-free behaviors after intervention exposure. Several pre–post intervention studies reported significant increases in smoking cessation self-efficacy scores and positive behavioral intentions toward quitting smoking ($p < 0.05$) [11].

Regarding nutritional outcomes, multiple studies identified improvements in dietary diversity, antioxidant intake, and household food allocation following reductions in tobacco expenditure. Families with decreased smoking-related spending showed increased allocation for nutritious foods, particularly among low-income households and families with children under five years old [12].

Overall, the evidence suggests that integrated health promotion interventions contribute not only to smoking prevention and cessation but also to improvements in nutritional-related outcomes and family health behaviors. Detailed characteristics and outcomes of the included studies are summarized in **Table 1.**

Table 1. Characteristics of Included Studies

No	Author (Year)	Research Title	Study Design	Population	Variables	Main Findings
1	Purwanti et al. (2016)	Effectiveness of MI Counseling on Adolescent Smoking Behavior in Makassar	Quasi-experimental	Adolescents 15–19 years	Smoking behavior, knowledge, cessation motivation	MI significantly reduced smoking intention ($p<0.05$) and increased motivation to quit.
2	Wahyuni & Syam (2017)	Nutritional Education and Smoking Behavior Among Household Heads in South Sulawesi	Cross-sectional	Household heads aged 25–55 years	Nutritional status, smoking behavior, food consumption	Active smokers had significantly lower vitamin C and zinc intake than non-smokers.
3	Notoatmodjo et al. (2018)	School-Based Health Promotion Program for Smoking	RCT	Middle and high school students	Knowledge, attitudes, smoking behavior	School-based interventions improved knowledge ($p<0.01$) and

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No	Author (Year)	Research Title	Study Design	Population	Variables	Main Findings
		Prevention				delayed smoking initiation.
4	Ramli & Hasanuddin (2019)	Social Media Campaign and Smoking Cessation Intention Among University Students	Mixed-method	University students 18–24 years	Cessation intention, self-efficacy, media exposure	Digital campaign exposure positively correlated with cessation intention (r=0.62, p<0.05).
5	Sari et al. (2020)	Effect of Smoking on Iron Absorption and Anemia Status	Cohort study	Women of reproductive age	Hemoglobin level, anemia status, passive smoking	Passive smoking increased anemia risk in pregnant women (OR=2.3, 95% CI 1.4–3.8).
6	Hidayat & Muslimin (2020)	Community Intervention for Smoking Reduction and Nutritional Improvement	Quasi-experimental	Rural communities, South Sulawesi	Smoking, nutritional status, food expenditure	Community intervention reduced smoking habits and improved nutritious food spending allocation.
7	Kemenkes RI (2021)	Evaluation of Smoke-Free Areas Program in South Sulawesi Province	Evaluative study	General public, South Sulawesi	Smoke-free area compliance, smoking prevalence	Smoke-free zone implementation reduced indoor secondhand smoke exposure by 38%.
8	Lestari et al. (2021)	Impact of Smoking on Nutritional Status of Children	Cross-sectional	Children 12–59 months	Child nutritional status, paternal smoking,	Children in smoker households were 1.8x more at risk of

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No	Author (Year)	Research Title	Study Design	Population	Variables	Main Findings
		Under Five in Smoker Families			food expenditure	stunting ($p<0.05$).
9	Yunus & Rahman (2022)	Peer Education for Smoking Prevention Among Urban Adolescents	RCT	Adolescents aged 13–17 years	Knowledge, attitudes, smoking behavior	Peer education improved knowledge ($d=0.74$) and reduced smoking prevalence.
10	Sulaiman et al. (2022)	Nicotine Replacement Therapy and Integrated Nutritional Intervention	RCT	Adult smokers 30–60 years	Body weight, nutritional intake, cessation rate	NRT combined with nutritional counseling increased cessation rate 2.4x vs. control.
11	Arifin & Kadir (2023)	Effect of Digital Health Promotion on Smoking Behavior in South Sulawesi	Pre-post study	General digital population	Smoking intention, knowledge of tobacco hazards	Digital intervention reduced smoking intention by 23% after 3-month intervention.
12	Nurhayati et al. (2023)	Relationship Between Tobacco Expenditure and Nutritious Food Consumption	Observational analytical	Low-income urban families, South Sulawesi	Tobacco expenditure, dietary diversity, nutritional status	Every 10% increase in tobacco spending correlated with decreased HDDS score ($p<0.05$).
13	Irwan & Basri (2024)	Effectiveness of Community-Based Smoking Cessation Workshop	Mixed-method	Adult active smokers	Cessation rate, self-efficacy, social support	Community workshops achieved 31% 6-month cessation rate ($p<0.01$).
14	Mappaware et al. (2024)	Integrated Nutritional	RCT	Active smokers	Nutritional status, BMI,	Nutritional intervention

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No	Author (Year)	Research Title	Study Design	Population	Variables	Main Findings
		Intervention in Active Smokers at Risk of Malnutrition		with malnutrition	antioxidant levels	significantly increased vitamin C and E levels in smokers ($p<0.05$).

Abbreviations: RCT = Randomized Controlled Trial; MI = Motivational Interviewing; HDDS = Household Dietary Diversity Score; OR = Odds Ratio.

Quantitative findings across the included studies demonstrated that health promotion interventions were consistently associated with reductions in smoking behavior and improvements in smoking-related knowledge and attitudes. Motivational interviewing interventions significantly increased smoking cessation motivation among adolescents and adults, while peer education programs effectively delayed smoking initiation among urban adolescents.

Regarding nutritional status outcomes, several studies demonstrated a meaningful relationship between reductions in smoking behavior and improvements in nutritional indicators. Among smokers who successfully quit or significantly reduced tobacco consumption, improvements were observed in plasma antioxidant levels (vitamins C and E), hemoglobin levels, and dietary diversity scores within 6 months post-intervention [13].

From a household economic perspective, studies found that reduced tobacco expenditure positively correlated with increased allocation for nutritious food, particularly in low-income families. This demonstrates an indirect mechanism through which anti-smoking interventions improve family nutrition, including that of children under five [14]

DISCUSSIONS

Effectiveness of Health Promotion Interventions in Smoking Prevention

The findings of this literature review reinforce the critical role of health promotion interventions in addressing smoking behavior in communities. Motivational interviewing (MI) proved most effective in enhancing intrinsic motivation to quit smoking, consistent with Self-Determination Theory, which emphasizes the importance of individual autonomy and competence in the behavior change process [15].

Community-based interventions appeared particularly effective in South Sulawesi due to the strong collectivist social culture within local communities. Social support mechanisms and peer influence may enhance adherence to smoking cessation programs, especially among adolescents and adult males where smoking is often socially normalized [16].

Compared with digital campaigns, motivational interviewing demonstrated stronger effectiveness in improving individual cessation motivation because the intervention directly addressed personal ambivalence and readiness to change. However, digital interventions offered broader population reach and lower implementation costs. [17]

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Relationship Between Smoking Behavior and Nutritional Status

This review confirms the bidirectional relationship between smoking behavior and nutritional status. Biologically, toxic components in tobacco smoke such as benzo[a]pyrene and cadmium inhibit the absorption of essential minerals including zinc, calcium, and iron, while generated free radicals accelerate depletion of vitamins C and E, which serve as primary antioxidants [18].

The impact of smoking on nutrition is not limited to active smokers. Passive exposure to secondhand smoke in pregnant women and children under five has been proven to increase the risk of anemia and growth disorders. This finding aligns with global evidence suggesting that smoke-free environments are an essential prerequisite for optimal nutrition in vulnerable populations [19].

Indirect Mechanism: Household Economy and Nutrition

The finding on the correlation between tobacco expenditure and family dietary diversity represents one of the important contributions of this review. In South Sulawesi, where poverty rates in several districts remain relatively high, tobacco spending reaching 10–15% of total family expenditure significantly reduces the capacity to purchase nutritious food. Health promotion interventions that successfully reduce tobacco consumption indirectly release economic resources that can be redirected toward family nutritional needs [19,20].

Implications for Health Policy in South Sulawesi

From a public health policy perspective, this review recommends integrating smoking prevention interventions into existing community nutrition programs. An integrated approach combining smoking cessation counseling with nutritional education and nutritional status monitoring will produce a greater synergistic impact compared to interventions conducted separately. Primary health care centers (Puskesmas) as the frontline of primary health services in South Sulawesi can serve as strategic platforms for implementing this approach [20].

Implementation Barriers

Several barriers may limit the effectiveness of smoking prevention interventions in South Sulawesi. Smoking remains culturally accepted among adult males, and tobacco advertising exposure remains high. In addition, limited access to trained smoking cessation counselors and low health literacy in rural communities may reduce intervention sustainability.

Limitations of the Review

Several limitations should be considered in this review. First, heterogeneity in study design, intervention duration, and outcome measurement limits comparability across studies. Second, most studies relied on self-reported measures, which may introduce social desirability bias. Third, evidence on the long-term effects of interventions on nutritional status changes remains limited. Additionally, variations in cultural contexts and implementation settings may influence intervention effectiveness, highlighting the need for context-specific adaptations.

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Long-Term Sustainability

Although most interventions demonstrated short-term effectiveness, evidence regarding long-term sustainability remains limited because the majority of studies had follow-up periods shorter than 12 months. Further longitudinal studies are needed to evaluate sustained behavioral and nutritional outcomes.

CONCLUSIONS

This review suggests that motivational interviewing, peer education, community-based interventions, and digital health campaigns were associated with reductions in smoking behavior and improvements in several nutritional indicators. Integrated smoking prevention and nutrition programs may provide substantial public health benefits for communities in South Sulawesi, particularly among low-income households and adolescents.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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AUTHOR CONTRIBUTIONS

Conceptualization: NAM; methodology: NAM and PD; formal analysis: NAM; writing-original draft preparation: NAM; writing-review and editing: PD.

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