



Smoking Related Questionnaire Scores Before and After Education Using Video and Leaflet among Adolescents

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Abstract

Background: Adolescent smoking remains a public health concern in Indonesia, while evidence on community-based smoking education in eastern Indonesia is limited. Video and leaflet materials offer practical approaches for delivering standardized tobacco-related information, but changes in immediate educational outcomes should be distinguished from changes in smoking behavior. **Objective:** To compare smoking-related questionnaire scores before and after video- and leaflet-based education among adolescents in the Laimu Public Health Center working area, Maluku, Indonesia. **Methods:** A one-group pretest-posttest study was conducted among 88 adolescents aged 10–18 years. Participants received smoking-related education using video and leaflet materials and completed the same questionnaire before and immediately after the educational session. Pretest and posttest scores were compared using the Wilcoxon signed-rank test. **Results:** Before the intervention, 38 participants (43.0%) were classified in the higher-score category (>25), compared with 77 (87.5%) immediately after the intervention. Individual paired comparisons showed higher posttest scores in 83 participants, a lower score in one participant, and unchanged scores in four participants. Posttest scores were significantly higher than pretest scores ($Z = -7.963$, $p < 0.001$). **Conclusion:** Smoking-related questionnaire scores increased immediately after video- and leaflet-based education among adolescents in the Laimu Public Health Center working area. The findings indicate a short-term improvement in the questionnaire outcome but do not establish smoking cessation or sustained behavioral change. Controlled studies with longer follow-up and behavioral outcomes are needed to determine whether these immediate changes persist and translate into changes in smoking behavior.

Keywords: adolescents; health education; smoking; tobacco prevention; video; leaflet

1. Introduction

Tobacco use during adolescence remains a public health concern because this developmental period is a common stage for the initiation and consolidation of smoking behavior. Nicotine is highly addictive, and exposure during adolescence may affect the developing brain, including processes related to attention and learning, while early nicotine use may increase the likelihood of longer-term dependence (World Health Organization, 2026). In Indonesia, the 2019 Global Youth Tobacco Survey (GYTS) documented substantial exposure to and use of tobacco among school-going adolescents, indicating that tobacco prevention remains relevant for this age group (World Health Organization & Ministry of Health Republic of Indonesia, 2019). These concerns are consistent with current global tobacco-control strategies, in which communicating the health consequences of tobacco use remains a component of the WHO MPOWER framework (World Health Organization, 2025).

Adolescent smoking develops within a broader social and behavioral environment rather than from insufficient knowledge alone. Evidence among adolescents has linked smoking with parental and peer smoking, social norms, access to tobacco products, socioeconomic circumstances, and individual behavioral characteristics (Altwickler-Hámori et al., 2024; Cheng et al., 2022). Indonesian studies show a similarly complex environment. Analysis of the 2019 Indonesian GYTS found that adolescents are exposed to both tobacco-promoting and anti-smoking messages, while tobacco advertising, promotion, and sponsorship remain relevant to youth smoking behavior (Megatsari et al., 2023a; Megatsari et al., 2023b). Research among adolescent smokers in Surabaya also identified social and personal factors associated with maintaining smoking behavior (Almaidah et al., 2021). Consequently, providing information about smoking-related harms may influence knowledge or other

questionnaire-based responses without necessarily producing an immediate or sustained change in smoking behavior.

This distinction is relevant when evaluating educational interventions. In a randomized controlled trial involving Indonesian adolescents aged 11–14 years, Tahlil et al. (2013) reported that a school-based smoking-prevention program improved smoking-related knowledge and attitudes, but the effects on smoking intention and behavior were less evident. Analysis of the 2019 Indonesian GYTS similarly showed that exposure to anti-smoking messages was not uniformly associated with more favorable smoking outcomes, illustrating that message exposure and smoking behavior do not have a simple relationship (Megatsari et al., 2023a). More recent evidence from adolescent tobacco-prevention research also suggests that educational interventions can improve proximal outcomes such as knowledge and intentions, while evidence for changes in actual tobacco use is less consistent (Gardner et al., 2024). These findings support distinguishing immediate educational outcomes from behavioral outcomes when interpreting short-term interventions.

The mode of delivering health information may influence how adolescents engage with educational content. Video-based education can combine visual and auditory information in a standardized format, whereas printed materials such as leaflets allow participants to review key messages after the educational session. Combining these formats is practical for community-based health education because the same core information can be delivered through complementary media. Nevertheless, the use of video or printed educational materials is not itself novel. The relevant question is whether such an approach produces measurable changes in the intended outcome when implemented within a specific population and service context. Evidence addressing smoking-related educational responses among adolescents in community-based primary-care settings in eastern Indonesia, particularly Maluku, remains limited.

This evidence gap is relevant to the Laimu Public Health Center working area in Maluku. Local records used in the present study documented a smoking prevalence of 22.08% in the working area in 2024, while a preliminary assessment identified 180 adolescents who smoked among 724 male adolescents. These local data indicate an existing adolescent smoking problem but do not establish whether brief educational exposure can modify smoking-related questionnaire responses in this population. Evaluating such an intervention may therefore provide context-specific evidence for adolescent health-promotion activities delivered through primary health-care services in Maluku.

The present study aimed to compare smoking-related questionnaire scores before and immediately after video- and leaflet-based education among adolescents in the Laimu Public Health Center working area. Given the uncontrolled pretest-posttest design and immediate post-intervention assessment, the study was designed to examine short-term changes in questionnaire scores rather than smoking cessation, sustained abstinence, or long-term behavioral change.

2. Materials and Methods

2.1 Study design and setting

This study used a quantitative pre-experimental one-group pretest-posttest design. It was conducted in the working area of Laimu Public Health Center, Telutih District, Central Maluku Regency, Maluku Province, Indonesia, from July to September 2025.

2.2 Population and sampling

The source thesis reports a population of 724 male adolescents in the Laimu Public Health Center working area. A total of 88 adolescents were included using purposive sampling. The thesis describes eligibility in general terms as willingness to participate and exposure to or experience with smoking-related issues; however, the final inclusion and exclusion criteria are not reported consistently enough to reproduce them precisely. Therefore, these criteria should be verified against the original research protocol before journal submission.

2.3 Health education intervention

After completion of the pretest, participants received health education on the hazards of smoking. The educational intervention used an animated video describing the effects of smoking. This was followed by a leaflet explaining harmful substances contained in cigarettes, the health hazards of smoking, prevention, and strategies to avoid smoking. The thesis does not report the exact duration, number of sessions, educator qualifications, or interval between intervention and posttest; these intervention details should be confirmed from the original field protocol before submission.

2.4 Outcome measure

The outcome was smoking-related behavior as operationalized in the source thesis. The dependent variable was measured using a questionnaire and classified as good (>25) or poor (≤ 25). The methods section contains inconsistent descriptions of the instrument, referring in places to knowledge and to either 10 or 11 items. It also reports that an instrument attributed to Widyawati et al. (2025) had corrected item-total correlations >0.361 and KR-20 reliability of 0.788. Because the thesis terminology alternates between knowledge and behavior, the final journal version should verify the exact questionnaire construct, item count, scoring system, and original instrument source against the questionnaire and raw dataset.

2.5 Data collection

Participants completed a pretest before receiving the smoking-hazard education. The educational video and leaflet were then provided, followed by posttest measurement. Data were edited, coded, scored, processed electronically, and analyzed statistically.

2.6 Statistical analysis

Categorical outcomes were summarized as frequencies and percentages. Pretest-posttest differences were evaluated using the Wilcoxon signed-rank test. Statistical significance was set at $p < 0.05$. The SPSS output reported an asymptotic significance of 0.000; in accordance with standard reporting practice, this is presented as $p < 0.001$.

2.7 Ethical considerations

This study was approved by the Research Ethics Committee of STIKES Pasapua Ambon, Ambon, Indonesia (No. 053/KEPK-STIKESPA/EC/2025). Written informed consent was obtained from all respondents prior to data collection. Participation was voluntary, and respondents were informed of the study purpose, procedures, confidentiality protections, and their right to decline participation.

3. Results

Table 1. Age distribution of participants (n=88)

Age (years)	n	%
10	4	4.5
11	7	8.0
12	6	6.8
13	9	10.2
14	10	11.3
15	9	10.2
16	11	12.5
17	13	14.8
18	19	21.6
Total	88	100.0

As shown in Table 1, participants ranged in age from 10 to 18 years. The largest proportion of respondents were 18 years old (21.6%), followed by those aged 17 years (14.8%) and 16 years (12.5%). The smallest proportion was found among 10-year-old participants (4.5%). Overall, the sample was predominantly composed of older adolescents.

Table 2. Smoking-related questionnaire score categories before and after education (n = 88)

Score category	Pretest, n (%)	Posttest, n (%)
Higher score (>25)	38 (43.0)	77 (87.5)
Lower score (≤ 25)	50 (57.0)	11 (12.5)
Total	88 (100.0)	88 (100.0)

As presented in Table 2, 38 participants (43.0%) were in the higher-score category and 50 (57.0%) were in the lower-score category. At posttest, 77 participants (87.5%) were in the higher-score category and 11 (12.5%) were in the lower-score category. These proportions describe score classification at two time points; they do not show that participants stopped smoking or achieved sustained behavior change.

Table 3. Paired comparison of pretest and posttest smoking-related questionnaire scores (n = 88)

Comparison	Negative ranks	Positive ranks	Ties	Z	p-value
Posttest vs. pretest	1	83	4	-7.963	<0.001

The Wilcoxon signed-rank test showed that 83 participants had higher posttest scores than pretest scores, one participant had a lower score, and four participants showed no change. Posttest smoking-related questionnaire scores were significantly higher than pretest scores ($Z = -7.963$, $p < 0.001$). This finding indicates a short-term improvement in the outcome measured by the questionnaire following the educational intervention. Because smoking status, cigarette consumption, and sustained abstinence were not measured, the result should not be interpreted as evidence of smoking cessation or behavioral change.

4. Discussion

This study found a clear short-term increase in smoking-related questionnaire scores following video- and leaflet-based education among adolescents in the Laimu Public Health Center working area. The proportion of participants classified in the higher-score category increased from 43.0% before education to 87.5% immediately afterward. At the individual level, 83 of 88 participants had higher posttest scores, whereas only one had a lower score and four had unchanged scores. The Wilcoxon signed-rank test confirmed a difference between the two measurement points ($Z = -7.963$, $p < 0.001$). These findings indicate that participants generally responded more favorably to the questionnaire immediately after receiving the educational material. They should not, however, be interpreted as evidence that the intervention reduced smoking, promoted cessation, or produced sustained behavioral change.

The observed increase is consistent with previous Indonesian evidence showing that structured tobacco education can improve proximal educational outcomes among adolescents. Tahlil et al. (2013), in a randomized controlled trial involving adolescents aged 11–14 years in Aceh, found that school-based smoking-prevention programs improved health-related knowledge, with some intervention components also improving smoking-related attitudes. The intervention in that study was substantially more intensive than the present intervention, consisting of eight classroom sessions delivered over two months, and outcomes were assessed one week after completion. The consistency in the direction of the knowledge-related findings across different intervention intensities suggests that adolescents can respond to structured smoking-prevention information, although the magnitude and persistence of the response cannot be assumed to be equivalent across studies.

The combination of video and leaflet materials may have contributed to participants' immediate responses by presenting the same health information through complementary formats (Galmarini et al., 2024; Hansen et al., 2024; Nassar et al., 2024; Taher & Nurhikmah, 2024). Video allows smoking-related information to be communicated through simultaneous visual and auditory cues, while a leaflet provides a stable written and visual source that participants can read at their own pace. A recent Indonesian one-group pretest-posttest study using animated video and leaflet education among junior high-school students similarly reported post-intervention changes in knowledge and attitudes related to the dangers of smoking (Kurniawati et al., 2025). Such findings support the feasibility of these media for adolescent health education, but they do not isolate the independent contribution of either medium. The present study administered video and leaflet materials as a combined intervention; consequently, it cannot determine whether the observed score increase was attributable primarily to the video, the leaflet, their combination, or other features of the educational session.

The age distribution of the participants also warrants consideration. Participants ranged from 10 to 18 years, with the largest proportion aged 18 years (21.6%), followed by those aged 17 years (14.8%). This represents a relatively broad developmental range, encompassing early through late adolescence. Differences in cognitive development, previous exposure to smoking, peer influence, and social environments may affect how adolescents at different ages understand and respond to tobacco-related information. Smoking behavior during adolescence is influenced by multiple interacting factors rather than health knowledge alone. Altwicker-Hámori et al. (2024), for example, identified individual, family, and social characteristics associated with adolescent smoking, illustrating that informational interventions operate within a broader behavioral context. The present sample size did not provide evidence on whether the magnitude of score change differed by age; therefore, the predominance of older adolescents should be considered when interpreting the applicability of these findings to younger adolescents.

The distinction between an immediate questionnaire response and actual smoking behavior is particularly relevant in the Indonesian context. Analysis of the 2019 Indonesian Global Youth Tobacco Survey by Megatsari et

al. (2023) showed that exposure to anti-smoking messages was not uniformly associated with lower smoking susceptibility or current smoking. Exposure to anti-smoking messages in media and at school was associated with higher odds of current smoking in their cross-sectional analysis, while no measured anti-smoking-message exposure was associated with smoking susceptibility. These counterintuitive associations do not establish that anti-smoking messages increase smoking, because the cross-sectional design cannot determine temporal sequence and current smokers may have greater exposure to such messages. They nevertheless demonstrate why exposure to educational or preventive messages should not automatically be equated with behavioral protection.

Adolescents are also exposed to competing tobacco-related influences outside an educational session. Indonesian GYTS data indicate substantial exposure to tobacco advertising, promotion, and sponsorship among young people (Megatsari et al., 2023). International evidence similarly identifies peer, family, socioeconomic, and behavioral factors as relevant correlates of adolescent smoking (Altwickler-Hámori et al., 2024). A brief educational encounter may therefore modify what adolescents know or how they respond to questionnaire items without being sufficient to counter the social availability, normalization, peer influences, or commercial promotion of tobacco products encountered in everyday life. This provides a plausible explanation for why improvement in a proximal educational outcome should be distinguished from prevention of smoking initiation or cessation among adolescents who already smoke.

Evidence from more intensive adolescent tobacco-prevention programs reinforces this distinction. Tahlil et al. (2013) demonstrated improvements in knowledge and some attitudinal outcomes following structured smoking-prevention education in Indonesia, but changes in smoking intentions and behaviors were less evident. More recent systematic-review evidence on school-based e-cigarette prevention has also shown that interventions may improve outcomes such as knowledge, attitudes, and intentions without consistently preventing subsequent product use. Gardner et al. (2024) found no statistically conclusive evidence of reduced e-cigarette use at the longest follow-up across included studies, which ranged from 6 to 36 months, and characterized the overall evidence as low to moderate in quality. Although e-cigarette prevention differs from conventional cigarette education and these findings cannot be transferred directly to the present population, they illustrate the broader gap that can occur between short-term cognitive outcomes and longer-term tobacco-use outcomes.

The findings have practical relevance for primary health-care education in the Laimu community. A video-and-leaflet format is feasible for delivering standardized smoking-related information to groups of adolescents and, in this study, was followed by higher questionnaire scores in most participants. The results support its use as an educational communication approach rather than as a stand-alone smoking-cessation intervention. For adolescents who already smoke, educational activities may need to be integrated with approaches addressing motivation to quit, nicotine dependence where applicable, peer and family influences, access to tobacco products, and appropriate cessation support (Blank et al., 2017; Corsello et al., 2026; Curry et al., 2009). WHO tobacco-control guidance similarly places communication about tobacco harms within a broader package of measures rather than treating health information as an isolated strategy (World Health Organization, 2026).

Several methodological limitations constrain interpretation. First, the one-group pretest-posttest design did not include a contemporaneous control group. The observed increase therefore cannot be attributed exclusively to the educational intervention because testing effects, familiarity with questionnaire items, attention from the research team, or other time-related influences cannot be separated from the intervention itself. Repeating the same questionnaire shortly after the educational session may be especially susceptible to testing or recall effects. Second, the posttest assessed an immediate response, so the study provides no evidence that higher scores were retained after days or months. Third, smoking status, cigarette consumption, quit attempts, nicotine dependence, smoking initiation, and sustained abstinence were not evaluated as outcomes. The findings consequently concern questionnaire scores rather than smoking cessation or prevention.

A further limitation concerns interpretation of the questionnaire itself. The categorical threshold of >25 versus ≤ 25 simplifies presentation but provides less information than the underlying continuous or ordinal score distribution. The paired Wilcoxon analysis appropriately uses participant-level score information, but reporting pretest and posttest medians and interquartile ranges would provide a clearer description of the magnitude of score change. The construct represented by the total questionnaire score, its scoring direction, validity and reliability, and the empirical or theoretical basis for the cut-off should also be clearly documented in the Methods. Without this information, the higher-score category should not automatically be labeled as “good knowledge,”

“positive attitude,” or another specific construct unless the instrument was designed and validated to support that interpretation.

The study provides context-specific evidence that smoking-related questionnaire scores can increase immediately after combined video- and leaflet-based education among adolescents in a community primary-care setting in Maluku. The consistency of the direction of change across participants is notable, with 83 of 88 participants recording higher scores, but the absence of a control group and longer follow-up prevents causal attribution or conclusions about sustained tobacco-related behavior. Future studies should use a controlled design, report the underlying score distributions and effect estimates, assess retention at subsequent follow-up points, and include behavioral outcomes when the research question concerns smoking prevention or cessation. Comparing video, leaflet, combined-media, and control conditions could also clarify whether combining educational formats offers an advantage over either medium alone.

5. Conclusions

Smoking-related questionnaire scores were higher immediately after video- and leaflet-based education among adolescents in the Laimu Public Health Center working area. Most participants (83 of 88) showed an increase in scores, and the paired comparison indicated a statistically significant difference between pretest and posttest measurements ($Z = -7.963$, $p < 0.001$). These findings support the potential use of combined video and leaflet materials as a practical approach for delivering smoking-related education to adolescents in a community primary-care setting. The findings should be interpreted as short-term changes in questionnaire scores rather than evidence of smoking cessation or sustained behavioral change. Controlled studies with longer follow-up, complete reporting of score distributions, and behavioral outcomes are needed to determine whether these immediate changes are maintained and translate into changes in smoking-related behavior.

Conflict of Interest

The authors declare no conflicts of interest.

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