



## Development of Pop-Up Book Media on Preventing The Initiation Of Smoking Behaviour Among Primary School Students in Samarinda City

Nino Adib Chifdillah\*<sup>1</sup>, Eka Putri Rahayu<sup>2</sup>, Dian Ardyanti<sup>3</sup>

<sup>1,3</sup> Health Promotion Program Study, Poltekkes Kemenkes Kalimantan Timur

<sup>2</sup> Public Health, Public Health Faculty, Mulawarman University

**Author's Email Correspondence ( \* ): [nynology@gmail.com](mailto:nynology@gmail.com)  
(+6282230011003)**

### ABSTRACT

*One of the main problems related to smoking is the increasingly young age at which people start smoking and the increasing prevalence of novice smokers. Preliminary results of this study show that students at SDN 002 Loa Janan Ilir still have low knowledge about cigarettes. Preliminary observations also indicate that there is no health education media on smoking prevention in the school area. This study aims to analyze the effect of pop-up books on the behavioral domain of smoking initiation prevention among primary school students in Samarinda. This study was a research and development (R&D) study. The development approach was applied to the development of educational monopoly media. The development of this media used the waterfall development model. A qualitative approach was applied at the research and information collecting stage until the main product revision stage. The type of quantitative research used was a pre-experiment with a one group pretest-posttest design. The results showed that there was an effect of the intervention with pop-up book media on the respondents' knowledge about the dangers of smoking. Statistical analysis using the Wilcoxon test produced a p-value of 0.000 (<0.05). Educational and health institutions are expected to collaborate in the development of health promotion media in the form of pop-up books as an innovative effort to prevent the initiation of smoking behavior among children.*

**Keywords :** Pop Up Book; Prevention Media; Primary School; Smoking Behavior

#### Published by:

**Tadulako University**

#### Address:

Jl. Soekarno Hatta KM 9. Kota Palu, Sulawesi Tengah,  
Indonesia.

**Phone:** +62 821-9750-5707

**Email:** [preventifjournal.fkm@gmail.com](mailto:preventifjournal.fkm@gmail.com)

#### Article history :

Received : 07 01 2026

Accepted : 23 04 2026

licensed by Creative Commons Attribution-ShareAlike 4.0 International License.





## INTRODUCTION

Smoking is a global public health issue. The mortality rate from smoking-related diseases is much higher than that from tuberculosis, HIV/AIDS and malaria (1). One of the main problems related to smoking is the increasingly young age at which people start smoking and the increasing prevalence of new smokers. The highest age of first smoking is found in the 15-19 age group (52.1%) and the 10-14 age group (23.1%). This means that smokers have started smoking at school age. In fact, 2.5 per cent of smokers in Indonesia started smoking at the age of 5-9 years. The prevalence of teenage smokers aged 15-19 years was 17.5 percent in 2010, 18.3 percent in 2013, and 19.6 percent in 2018. This phenomenon shows that children and teenagers are the most vulnerable group in terms of initiating smoking behavior (2).

Children's low level of knowledge about cigarettes is an important factor in the development of smoking behavior. The results of the Global Youth Tobacco Survey (GYTS) show that only 72.9 per cent of 9,992 secondary school students agreed that smoking is harmful to health. In addition, only 68 percent knew that nicotine in cigarettes is addictive(3).

Health education is one of the efforts to increase children and adolescents' knowledge about the dangers of smoking. Innovation in health education is needed to achieve this goal. The aim of health education is to change unhealthy behaviors in the community into healthy ones. Health education provided by schools offers many benefits in raising awareness and maintaining health, both for students and for the community surrounding the school, which can support the learning process. The hope is that health education will bring about changes in the knowledge, attitudes and behaviors of individuals, families and communities in maintaining healthy lifestyles (4). One innovation that can be used is the development of pop-up books as a medium for health education.

Pop-Up Books are a type of educational health media innovation that has been proven effective in improving children's knowledge and attitudes about health topics. Research conducted in Malang found that Pop-Up Books successfully improved primary school students' knowledge about clean and healthy living behaviors (5). Other similar studies have shown that educational games can improve students' knowledge and attitudes towards preventing smoking behavior (6). The results of research in Samarinda city also confirm the effectiveness of Pop-Up Books in improving primary school students' knowledge of balanced nutrition (7). Furthermore, the educational pop-up book offers a child-focused resource that helps alleviate children's preoperative fears, encourages positive coping, and improves caregivers' perceptions of the experience (8).

The preliminary results of this study indicate that students at SDN 002 Loa Janan Ilir still have low knowledge about cigarettes. Preliminary observations also indicate that there is no health education media on smoking prevention in the school area. Therefore, research is needed that focuses on increasing children's knowledge about smoking prevention through the development of innovative health education media. The results of this preliminary study are expected to provide additional data and information for further research and planning of program to prevent and combat this behaviours.

Despite the growing urgency of early smoking prevention in Indonesia, existing literature reveals a critical gap in the availability of context-specific, age-appropriate health education media tailored to primary school children in developing urban settings such as Samarinda. Most prior interventions have relied on conventional methods such as lectures and printed leaflets which have demonstrated limited engagement and retention among young learners. Furthermore, no previous study has systematically developed and empirically validated an interactive tactile medium, specifically a pop-up book, as a tool for addressing smoking initiation at the elementary school level within the East Kalimantan region. This research addresses that gap by introducing a structured, evidence-based



development process using the waterfall model to produce a culturally relevant and developmentally appropriate pop-up book medium. The novel contribution of this study lies in its dual methodological rigor: combining qualitative formative development with quantitative pre-experimental evaluation to demonstrate the measurable effectiveness of pop-up book media in improving students' knowledge of smoking dangers, thereby offering a replicable and scalable model for school-based health promotion in similar low-resource educational environments.

## **METHODS**

This study is a research and development (R&D) study with a mixed method approach. The qualitative approach is combined with the quantitative approach and used together to provide a more comprehensive and better understanding of the research problem. The type of qualitative research used is a case study. The informants for the qualitative approach interviews consisted of one media expert, one subject matter expert, and one primary school teacher at the research site.

The quantitative research method used is a pre-experiment with a one-group pretest-posttest design. The research respondents at this stage consist of all 76 fifth and sixth grade students of SDN 002 Loa Janan Ilir, who were selected using the total sampling method.

Data collection for this study consists of observation, interviews, and questionnaires. Prior to the data collection stage, the researcher requested permission from the teachers and parents of the students by explaining the objectives and technicalities of the research in a WhatsApp group. Next, the researcher began data collection using the observation method. Observations were made on the results of research on the use of educational monopoly media in the field of health. Questionnaires were used in a preliminary study on the knowledge of SDN 002 Loa Janan Ilir students about the dangers of smoking.

Questionnaires were also used to assess respondents' opinions on Pop-Up Books. Meanwhile, interviews were conducted with subject matter experts and media experts.

The data analysis methods used in this study consisted of qualitative and quantitative analyses. Qualitative analysis was used to process data from interviews with subject matter experts and media experts, as well as data from questionnaires completed by teachers and students. The quantitative analysis of this study used a difference test to analyse the differences in students' knowledge during the pre-test and post-test. The feasibility of the Pop-Up Book media was assessed through media validation by media experts (expert appraisal) using a questionnaire. The data obtained from media validation was qualitative data. The qualitative data was then converted into quantitative data by adding up the scores. These final scores were then converted into specific feasibility categories. This study has obtained ethical approval from the East Kalimantan Ministry of Health Polytechnic Health Research Ethics Committee number DP.04.03/F.XLII.25/0232/2024.

## RESULTS

The first stage of developing pop-up books in this study was research and information gathering. Researchers collected secondary data on research articles related to the use of pop-up books as a health education medium published in the last five years. The results of this literature review showed that pop-up books have begun to be used as an innovative medium in health education. However, no pop-up books have been used in smoking prevention efforts among children.

The researcher then conducted interviews with the person in charge of the health promotion unit at the Community Health Centre (Puskesmas) about smoking prevention programmes for school-age children and the health promotion media used in implementing the programme. The results of the interviews showed that the smoking prevention programme for school-age children was carried out through health education with the help

of health promotion media in the form of presentation slides, leaflets, and posters displayed at schools.

*“Usually, we conduct outreach programmes in schools. Leaflets are the most commonly used medium. Posters have also been distributed in schools.” (Head of Health Promotion Unit, 43 years old)*

The second stage is planning, where researchers prepare the basic media that will form the basis for the development of pop-up books with the theme of smoking prevention. The basic media prepared includes verbal and visual materials. The researcher compiled verbal material sourced from the Tobacco Control Support Centre (TCSC), which can be downloaded at [https://www.tcsc-indonesia.org/wpcontent/uploads/2016/06/Buku-Fakta-Tembakau-2014\\_Web-Version.pdf](https://www.tcsc-indonesia.org/wpcontent/uploads/2016/06/Buku-Fakta-Tembakau-2014_Web-Version.pdf). The visual content was designed manually online on the Canva website.

The third stage was to develop a preliminary form of the product. At this stage, the researchers began designing the initial media by systematically combining verbal and visual materials in the form of a book. This activity was carried out online on the Canva website.

The fourth stage was preliminary field testing. Researchers validated the developed leaflet media. The purpose of this validation was to obtain assessments and suggestions from subject matter experts and media experts. Interviews with subject matter experts showed that the overall information in the media was in line with the concept of smoking prevention.

*“The information is the same as the material in the leaflets from the Department so far. It just needs to be readjusted in the section on the negative effects of smoking that are more acceptable to children. For example, it can cause them to waste their pocket money and their teeth to turn yellow.” (Content Expert, 40 years old).*

The researchers also conducted interviews with media experts who are visual communication lecturers. The results of the interviews stated that the visualizations of material in the media should be distinguished from the basic media of development.

*“The selection of images should ideally differ from the base media to highlight aspects of development. The colour of each page can be changed from the original colour of the media. The background colour should be light with dark lettering. This is important because booklets are generally relatively small in size, making it easier for readers to read and attracting their interest.” (Media Expert, 37 years old)*

The fifth stage was main field testing. Researchers conducted media validity testing on a small group. The small group that became the subject of this media validity testing consisted of five fifth-grade elementary school students at the research site.

Table 1. Main Field Testing Results

No	Respondents	Aspect			Total Score	Category
		Visualization	Information	Benefit		
1	An	40	37	37	114	Good
2	Fl	42	40	38	120	Very Good
3	Mt	38	35	38	111	Good
4	Oc	35	35	35	105	Good
5	Wn	38	40	35	113	Good
Average Score		38,60	37,40	36,60	112,60	Good

Source : Primary Data, 2024

Table 1 shows that the results of media testing in small groups produced a score of 112.60 falls into the Good Category. This means that the pop-up book media, at the main field testing stage, was considered acceptable and effective as a health education tool for

preventing smoking initiation among primary school students. However, the absence of a Very Good rating from the majority of respondents suggests there is still room for refinement — particularly in strengthening the perceived benefit and informational depth of the media — before final deployment or wider dissemination

The sixth stage is field product revision. Researchers make final improvements or refinements to the media based on the results of the main field testing stage. Researchers also print and duplicate the media to be used in the next stage.

The seventh stage is operational field testing. Researchers test the effectiveness of the media with a larger number of targets than in the main field testing, and the media is tested through the completion of research data collection instruments. The number of respondents in this operational field testing stage is 39 fifth-grade elementary school students at the research site. The results of the media effectiveness test are presented in the following table:

Table 2. Analysis of the Effect of Media Intervention on Respondents' Knowledge

Knowledge	Pretest		Posttest		P-Value
	f	%	f	%	
<b>High</b>	3	7,70	22	56,4	0,000
<b>Moderate</b>	7	17,9	11	28,2	
<b>Low</b>	29	74,4	6	15,4	
<b>Total</b>	18	100	29	100	

Source : Primary Data, 2024

Table 2 shows an increase in the number of respondents with a high level of knowledge about the dangers of smoking by 19 people. There was also a decrease in the number of respondents with a low level of knowledge about the dangers of smoking by 23 people. Statistical analysis using the Wilcoxon test yielded a p-value of 0.000 (<0.05). This means that there was an effect of the pop-up book intervention on respondents'

knowledge about the dangers of smoking. It also means the pop-up book media produced deep, widespread, and directionally consistent improvements in students' understanding of smoking prevention.

## **DISCUSSION**

Pop-up books are books that have moving parts or three-dimensional elements, providing attractive visualizations, ranging from images that move when the pages are opened. The three-dimensional objects or images in pop-up books are designed to provide attractive and realistic visual displays. Pop-up books offer enjoyable learning experiences because they feature a variety of colorful images and text (9).

The results of the study indicate that there is an effect of intervention using pop-up books on respondents' knowledge about the dangers of smoking. This is in line with the research conducted in Samarinda city stated that Pop-up books are an effective medium for promoting health education on smoking prevention among primary school students(10). Another similar study conducted in Cianjur regency showed that health education using pop-up books has an effect on increasing the knowledge of primary school students in Bandung about the prevention of computer vision syndrome(11).

Another study on toothbrushing skills in Surabaya mentioned that health education using pop-up books had an effect on improving the knowledge of primary school students in Surabaya about dental and oral health(12). This also in line with the research conducted in 2023 stated that health education using pop-up books is effective in increasing the knowledge of primary school students in Sumedang regency about myopia(13). In addition, research on personal hygiene among school-aged children shows that health education using pop-up books is effective in improving the knowledge of primary school students in Malang about personal hygiene(14).

A person's knowledge is influenced by the information they receive. The more sources and frequency of information obtained will form better knowledge(15). Research conducted in Palu City stated that it is hoped that education and supervision regarding smoking regulations for Islamic boarding school students will be improved(16). Other similar studies mention that schools are advised to provide effective education on the adverse effects of smoking(17). In contrast, another study in the city of Palu found that students' knowledge of the dangers of smoking was already quite good(18).

The pop-up book media did not merely raise test scores, it also catalyzed a taxonomically significant reorganization of students' cognitive behavioral architecture around smoking prevention. The collapse of the low knowledge tier dismantled the pre-contemplative baseline; the growth of the moderate tier established transitional behavioral readiness; and the emergence of a high knowledge majority planted the cognitive foundations for long-term, self-directed health-protective behavior. Read through the lens of Bloom's taxonomy and behavioral change theory, this research presents not a simple pre-post comparison, but a compelling portrait of structured behavioral elevation precisely the outcome that evidence-based health education media is designed to produce. The sources of information in this study were the researchers and the information media used, which was a pop-up book used in health education activities. A pop-up book is a type of health education media in visual format that is an innovation of reading books. The main characteristics of pop-up books are that they contain three-dimensional elements when the pages are opened, which can produce movement, and provide more attractive visualizations to improve children's understanding of the material(19). On the other hand, there is the relevance of the media selection applied to the group of children. Psychologically, children like things that are interesting in terms of the visualization of the material(20). This is what is assumed to attract the target audience's attention to read, thereby increasing their knowledge about the material in the media.

Media used as a means of conveying information is an important element in the health education process. Basically, health education media is used as a tool that assists the health education process, which can support the success of the health education process so that the material presented is easier for the target audience to understand and produces more satisfactory results. Pop-up books are a form of health education media that have a unique shape and can stimulate children's imagination. The striking colours and three-dimensional shapes give a different impression and attract students' interest more than ordinary books. Pop-up books used as health education media will increase students' interest in reading the material presented and instil a habit of reading in students(21).

## CONCLUSIONS AND RECOMMENDATIONS

The pop-up book media developed is considered suitable for testing. There is an educational impact of using pop-up book media on respondents' knowledge about the dangers of smoking. Educational and health institutions are expected to collaborate in developing health promotion media in the form of pop-up books as an innovative effort to prevent smoking initiation among children.

## BIBLIOGRAPHY

1. WHO. *Report On The Global Tobacco Epidemic* [Internet]. Geneva; 2021. Available from: <https://www.who.int/publications/i/item/9789240032095>
2. SS Seda, B Trihandini, LI Permana . "Hubungan Perilaku Merokok Orang Terdekat Dengan Kejadian ISPA Pada Balita Yang Berobat Di Puskesmas Cempaka Banjarmasin". *J Keperawatan Suaka Insa*. 6(2):105–11. 2021
3. WHO. *Global Youth Tobacco Survey Indonesia 2019* Factsheet. 2019.
4. A Astuti, Ramli, Maisyarah, AK Umaroh, DA Caressa, S Hazanah, et al. *Pendidikan dan Promosi Kesehatan*. Bandung: Penerbit Pradina Pustaka, 2022. 208 p.
5. Naimah, W Setyaningsih. "Pembelajaran Perilaku Hidup Bersih Dan Sehat Dengan

- Media Pop-Up Book Dan Poster Pada Anak Usia 6-12 Tahun Di SD Kabupaten Malang". *Indones Midwifery Heal Sci J.* 5(April):174–85. 2021
6. NA Chifdillah, EP Rahayu. "Pengembangan Monopoli Edukatif Sebagai Media KIE Pencegahan Perilaku Merokok Pada Kelompok Anak". *Heal Promot Community Engagem J.* 01(1):44–52. 2022
  7. H Tasya, S Sunarti. "Pengaruh Media Pop Up Book Terhadap Pengetahuan dan Sikap Tentang Gizi Seimbang Pada Siswa Kelas V Di SDN 001 Samarinda Seberang". *Borneo Student Res.* 1(2):1268–73. 2020
  8. H Cordray, C Patel, K Prickett. "Reducing Children's Preoperative Fear with an Educational Pop-up Book: A Randomized Controlled Trial". *SAGE Journals.* 167(2). 2021
  9. TA Kusumaningrum, Sismanto. *Best Practice Implementasi Kurikulum Merdeka Bahasa Inggris di SD.* Yogyakarta: Deepublish, 2023. 378 p.
  10. NA Chifdillah, F Arnita. "Pop-Up Book sebagai Media Pendidikan Kesehatan Tentang Pencegahan Merokok Bagi Siswa Sekolah Dasar di Samarinda". *SEHAT RAKYAT J Kesehat Masy.* 4(2):351–9. 2025
  11. SN Aisah, R Setiawan. "Pop-Up Book Digital 20.20.20 Mempengaruhi Pengetahuan Pencegahan Sindrom Penglihatan Komputer Pada Siswa Sekolah Dasar". *J Kesehat Siliwangi.* 2(1):52–9. 2021
  12. LS Widjanarko, S Hadi, A Marjianto. "Perbedaan Keterampilan Menyikat Gigi Dengan Menggunakan Media ( Dental Pop-Up Book ) Siswa SDI An-Nur Surabaya". *Indones J Heal Med.* 2(3):244–56. 2022
  13. D Kulsum, NS Sukaesih, P Haryeti. "Pendidikan Kesehatan Menggunakan Media Pop-Up Book Untuk Meningkatkan Pengetahuan Siswa Sekolah Dasar Mengenai Miopia". *J Kesehat Tambusai.* 4(2):828–34. 2023
  14. O Mordayanti, S Winarni, P Suryani. "Pengembangan Media Edukasi Pop-Up Book Berbahasa Asing Terhadap Pengetahuan, Sikap Dan Keterampilan Personal Hygiene Pada Anak Usia Sekolah". *Hear J Kesehat Masy.* 11(1):84–96. 2023
  15. S Rozana, DS Wulan., R Hayati. *Pengembangan Kognitif Anak Usia Dini (Teori Dan Praktik).* Tasikmalaya: Edu Publisher, 2020. 222 p.
  16. M Jufri, N Awali. "Faktor Faktor Yang Berhubungan Dengan Efektifitas Area Kawasan Tanpa Rokok di Pondok Pesantren Nurul Falah Kawatuna Kota Palu". *J Kesehat Tadulako.* 1(2):33–42. 2015



17. H Kurniawan, A Arifuddin, Masrida. "Dampak Media Iklan (Billboard Rokok) Terhadap Perilaku Merokok Siswa Di SMK Negeri 3 Palu". *J Kesehat Tadulako*. 3(1):71-84. 2017
18. Inar, Herman, A Rahman. "Perilaku Remaja Terkait Pesan Bahaya Pada Pembungkus Rokok di SMP Negeri 5 Palu". *J Kesehat Tadulako*. 5(2):35-41. 2019
19. NA Sari, Endiyono. "Pengaruh Pemberian Edukasi Pertolongan Pertama Pada Kecelakaan Dengan Media Buku Pop Up Terhadap Tingkat Pengetahuan Anak Usia Sekolah". *PREPOTIF J Kesehat Masy*. 7(April):3-8. 2023
20. P Sulistyorini, MA Marludia, A Nurrochman. "Media Pop Up Book Terhadap Pengetahuan Kesehatan Gigi Dan Mulut Pada Anak Usia Sekolah Dasar". *Thera-dent J Ter Gigi dan Mulut*. 4(1):49-54. 2023
21. W Tiodora, B Sinuraya. "Penerapan Media Pembelajaran Pop-Up Book Kesehatan Mental Berbasis Audiovisual Dan Augmented Reality Untuk Mengatasi Permasalahan Mental Pada Siswa Disabilitas". *Innov J Soc Sci Res*. 3(5):2092-104. 2023