

EDUCATION ON ADDICTIVE AND ADDICTIVE SUBSTANCES AND EXPERIMENTS: THE DANGERS OF SMOKING TO HEALTH

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Abstract. Adolescent smokers are a group particularly vulnerable to the negative effects of addictive and addictive substances in cigarettes, such as nicotine and tar. Limited understanding of the risks of smoking increases the likelihood of becoming active smokers or being affected by passive smoking and third-hand smoke. The Student Creativity Program was conducted at SMP Adhyaksa Ende, aiming to enhance students' knowledge about the dangers of smoking through a simple and interactive practical approach. The activities included an initial presentation, a practicum demonstration using a plastic bottle filled with water with holes on the top and bottom, where a small pipe was installed at the bottom hole. Cotton at the bottle mouth served as a filter, while a cigarette was placed in the top hole to demonstrate the release of harmful substances. During the session, students were actively engaged through question-and-answer discussions regarding the effects of nicotine, tar, and passive smoking risks, making the learning process interactive. The results showed increased student awareness of smoking risks, their ability to identify harmful substances in cigarette smoke, and visual understanding of smoke dispersion and filtration. The discussion emphasizes the importance of combining demonstrative, participatory, and interactive methods to strengthen adolescents' understanding and develop critical attitudes toward smoking. In conclusion, this PKM effectively conveyed information on addictive and addictive substances, enhanced student engagement, and fostered preventive awareness. Recommended follow-up actions include repeating the program in other classes, integrating adolescent health education into the school curriculum, and developing interactive educational modules based on simple practicum to sustain awareness of smoking hazards.

Keywords: educational experiment, cigarettes, addictive substances

Abstrak. Perokok remaja merupakan kelompok yang rentan terhadap dampak negatif zat adiktif dan zat aditif dalam rokok, seperti nikotin dan tar. Kurangnya pemahaman mengenai risiko rokok meningkatkan kemungkinan mereka menjadi perokok aktif atau terdampak perokok pasif dan third-side smoke. Program Kreativitas Mahasiswa di SMP Adhyaksa Ende bertujuan meningkatkan pengetahuan siswa mengenai bahaya rokok melalui pendekatan praktikum sederhana dan interaktif. Metode kegiatan meliputi pemaparan materi di awal, demonstrasi praktikum menggunakan botol plastik berisi air dengan lubang di tutup dan bagian bawah, di mana pipa dipasang pada lubang bawah dan kapas pada mulut botol sebagai filter, serta rokok ditempatkan di lubang tutup untuk menunjukkan proses pengeluaran zat berbahaya. Selama pemaparan materi, siswa dilibatkan aktif melalui sesi tanya jawab mengenai efek nikotin, tar, dan risiko perokok pasif, sehingga pembelajaran menjadi interaktif. Hasil kegiatan menunjukkan peningkatan kesadaran siswa terhadap risiko rokok, kemampuan mengenali zat berbahaya dalam asap, dan pemahaman visual mengenai penyebaran serta filtrasi zat berbahaya. Pembahasan menekankan pentingnya kombinasi metode demonstratif, partisipatif, dan interaktif untuk memperkuat pemahaman remaja dan membentuk sikap kritis terhadap rokok. Kesimpulannya, PKM ini efektif menyampaikan materi zat adiktif dan aditif, meningkatkan keterlibatan siswa, dan membentuk kesadaran preventif. Rekomendasi tindak lanjut mencakup pengulangan program di kelas lain, integrasi materi kesehatan remaja ke kurikulum sekolah, serta pengembangan modul edukatif interaktif berbasis praktikum sederhana untuk menumbuhkan kesadaran berkelanjutan terhadap bahaya rokok.

Kata Kunci: praktikum edukatif, rokok, zat adiktif

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INTRODUCTION

Smoking behaviour among adolescents, especially junior high school students, remains a public health issue that requires serious attention. Adolescents are in a phase of development characterized by significant biological, psychological, and social changes (Tyas & Pederson, 1998). At this stage, individuals tend to have a high level of curiosity, a drive to try new things, and a strong need for social acceptance from their surroundings. Peer pressure, the influence of social circles, and exposure to smoking behaviour in the family and community often encourage adolescents to try cigarettes as part of the process of exploring their identity (Ama et al., 2021). If not balanced with adequate health knowledge and awareness, this behaviour of trying cigarettes has the potential to develop into a permanent smoking habit in adulthood (Asiyanbi et al., 2025).

From the perspective of health behaviour theory, smoking behaviour among adolescents can be explained through the knowledge–attitude–practice (KAP) theory, which states that an individual's level of knowledge will influence their attitude, and subsequently be reflected in their health behaviour (Haq et al., 2019). Adolescents with low knowledge about the dangers of smoking tend to have permissive attitudes and consider smoking to be normal or harmless behaviour. Conversely, increased knowledge accompanied by a good understanding of health risks can shape negative attitudes toward smoking and encourage behaviour that rejects the habit of smoking (Nurjannah et al., 2023). Therefore, health education is a key component in efforts to prevent smoking behaviour, especially among junior high school students who are still in the stage of forming attitudes and values in life (Sutha et al., 2023).

The urgency of educating people about the dangers of smoking is reinforced by the fact that cigarettes contain various harmful substances that have a serious impact on health (Asiyanbi et al., 2025). The main addictive substance in cigarettes, nicotine, is highly addictive and can affect the nervous system and brain function of adolescents who are still in the developmental stage (Grzywacz et al., 2022). In addition to nicotine, cigarettes also contain harmful additives such as tar and carbon monoxide, which contribute to damage to the respiratory system, circulatory disorders, and an increased risk of chronic heart and lung disease (Sari et al., 2019). These negative effects are not only felt by active smokers, but also by passive smokers who are exposed to cigarette smoke in their surroundings. This condition shows that smoking has broad health implications and impacts the quality of life of individuals and society (Goldenberg et al., 2014).

In addition to knowledge factors, smoking behaviour among adolescents is also influenced by the interaction between intrinsic and extrinsic factors. Intrinsic factors include curiosity, identity search, and coping mechanisms for emotional stress (Tyas & Pederson, 1998). Meanwhile, extrinsic factors include the influence of family, social environment, media, and peers who smoke (Ama et al., 2021). An environment that is permissive towards smoking can normalize smoking behaviour among junior high school students, so that they view smoking as something common and harmless (Zhao et al., 2018). In this context, schools become a strategic environment for educational interventions to balance these negative influences by instilling healthy living values from an early age (Chamut et al., 2024).

Various studies and community service activities show that educational and outreach programs on the dangers of smoking are effective in increasing knowledge, forming negative attitudes towards smoking, and encouraging healthy behaviours among junior high school students. An educational approach tailored to the characteristics of adolescents, using communicative language, visual media, and participatory methods, has been proven to be more easily accepted and understood by students. Participatory education allows students to be actively involved in the learning process, so that the information received is not one-way, but is processed critically and reflectively (Hakameri et al., 2021; Wulandari et al., 2023). In addition, creative campaigns such as no cigarettes is cool can build students' intrinsic motivation to stay away from cigarettes by instilling a positive self-image and the value of health as part of the adolescent lifestyle (Nisa, 2025).

In addition to conventional counselling methods, direct educational activities through community service in schools play an important role in increasing the effectiveness of health messages (Gizaw et al., 2022). Direct interaction between facilitators and students allows for two-way dialogue, clarification of misconceptions, and strengthening of social skills, such as the ability to refuse peer pressure to smoke. Several studies show that experience-based and real-life context approaches help students understand the dangers of smoking in a more concrete and relevant way to their daily lives (Prihatiningsih et al., 2020; Putri et al., 2025). Thus, education not only serves as a means of information transfer but also as a process of shaping attitudes and preventive skills.

Based on the review of theory and previous research results, it can be concluded that educational interventions regarding the dangers of addictive and addictive substances in cigarettes are very necessary for junior high school students. Planned health education, based on health behaviour theory, and delivered through an interactive and participatory approach, is expected to increase knowledge, shape critical attitudes, and foster awareness among adolescents in maintaining their health and the environment. Therefore, this educational activity not only aims to provide information about the dangers of smoking, but also to build a foundation for healthy living behaviours and preventive skills that students can apply in their daily lives as an effort to prevent smoking behaviour from an early age.

METHOD

The implementation method for this community service activity began with planning by a team of third-semester Biology Education students at Flores University in 2025, in collaboration with Adhyaksa Junior High School as a partner. The target of the activity was eighth-grade students, who are at a stage of cognitive and social development that is vulnerable to environmental influences, including smoking habits in early adolescence. The stages of the activity consisted of preparation, implementation, and analysis of results.

In the preparation stage, the team compiled learning materials on addictive and addictive substances in cigarettes and their impact on adolescent health (Abd El Aziz, et al., 2024). In addition, tools and materials for simple practical work were prepared, consisting of plastic bottles filled with water, small pipes as air ducts, and cotton placed at the mouth of the bottle to capture cigarette combustion residues (Shah et al., 2023). These tools and materials aim to visualize how harmful substances are dispersed through cigarette smoke and adhere to intermediate media (Al Ankily et al., 2024)

The implementation stage began with an opening session and an introduction to the topic, presented in simple language that was easy for students to understand. The material was delivered interactively through a brief presentation, followed by a practical demonstration. Cigarettes were lit, and the smoke was channelled through a pipe into a bottle filled with water, exiting through cotton wool in the bottle cap, which then showed the tar and nicotine residue. During the activity, the facilitator asks interactive questions such as “what substance causes addiction?” or “why does cigarette smoke stick to clothes?”, so that students are actively involved in the learning process. Although no formal pre-test or post-test is conducted, student activity and participation serve as indicators of the activity's success.

The results of the activity were analyzed descriptively based on direct observation of student participation, their responses during the activity, and the results of the practical visualization. This approach was chosen to assess the effectiveness of the activity in raising students' awareness of the dangers of addictive and addictive substances in cigarettes. The results of the analysis were used to recommend follow-up actions, such as repeating the activity in other classes, integrating adolescent health material into the school curriculum, and developing interactive educational modules based on simple practical work.

RESULT AND DISCUSSION

The implementation of educational activities on the dangers of smoking at Adhyaksa Junior High School showed a very positive response from the students. Based on observations

during the activities, most students showed a high level of enthusiasm, both during the presentation of the material and during the practical sessions. This enthusiasm was reflected in the students' active involvement in observing the demonstration process, asking questions, and discussing the harmful substances contained in cigarettes (Naganandini et al., 2024). Students were able to identify the main addictive substance, nicotine, as well as harmful additives such as tar and carbon monoxide contained in cigarette smoke (Mroczek et al., 2024). This initial knowledge and active involvement show that contextually designed health education can increase students' attention and participation in learning about important health issues from an early age.



Figure 1. *Simple practical activities*

Students' understanding is gained through simple practical activities using plastic bottles, pipes, water, and cotton as demonstration media. The visualization of brownish deposits forming on the cotton wool during the practical activity provides a concrete illustration of the accumulation of harmful substances from cigarette smoke, helping students understand that these harmful substances can enter and accumulate in the human body when smoking, and can also be inhaled by passive smokers around them. This learning approach strengthens students' conceptual understanding of visual samples of the effects of harmful substances, so that it does not stop at theoretical understanding alone but also includes empirical learning experiences.

These findings are consistent with the results of community service reports that participatory education can significantly increase students' knowledge about the dangers of smoking. For example, participatory educational activities involving lectures, videos, and simple demonstrations at MTs Babul Mujahidin showed a significant increase in knowledge after the intervention (pre-post test) and high enthusiasm from participants during the activities (Nurul et al., 2025). Similar results were also reported in smoking education activities among adolescents that emphasized a hands-on approach in delivering the material, showing that active participant involvement is very important in health learning (Julaecha, 2024).

In addition to practical work, interactive discussion and question-and-answer sessions demonstrated that students were able to develop their critical thinking skills. Students asked questions about the effects of nicotine on the nervous system, the mechanism of cigarette smoke exposure to the lungs, and the long-term effects on health. The students' ability to formulate these in-depth questions shows that education based on direct experience can facilitate children's critical thinking skills, which is an important aspect in forming healthy attitudes from an early age. This is in line with other findings that show that educational methods that actively involve participants can influence their perceptions and awareness of smoking-related health issues (Yusnitasari et al., 2019). The importance of participatory methods is also supported by community service, which shows that interactive counselling approaches, not just one-way lectures, successfully improve students' understanding of the dangers of smoking. For example,

Nurarifah & Sukmawati (2024) showed a significant increase in knowledge scores after the intervention, with more participants becoming aware of the health risks of smoking.



Figure 2. *Presentation of material*

Further discussion shows an increase in students' awareness of the different health effects experienced by active and passive smokers. Students began to understand that exposure to cigarette smoke can be harmful to the health of not only the individual who smokes, but also to others around them, a concept that was also demonstrated in the results of another study targeting adolescents as the target group for health education (Munusari et al., 2025). In this study, the education materials covered the dangers of cigarettes and vaping, as well as the factors that cause smoking behaviour, which were then discussed more broadly in a question-and-answer session to increase students' understanding and awareness.

This demonstration-based educational activity is like the approach used in other educational activities that feature visual and interactive methods to increase awareness and critical attitudes towards smoking behaviour. Activities such as counselling and educational videos conducted among teenagers at SMKN 3 Gowa show that attractive and applicable educational media can stimulate student participation and understanding regarding the prevention of smoking behaviour (Marhawati et al., 2025). The advantage of the activity at SMP Adhyaksa lies in the direct involvement of students in simple experiments, so that participants not only receive information passively but also experience the learning process directly.



Figure 3. *Group photo with students at the end of the community service activity*

Compared to previous community service activities that emphasized one-way counselling, the activities here offer a more practical and interactive approach. This experiential learning approach allows students to relate educational material to real-life situations, thereby increasing the potential for changes in attitudes and behaviours toward smoking (Mpousio et al., 2021). This approach is consistent with findings from several community service programs and studies showing that school-based health education programs that emphasize direct student involvement are effective in increasing their knowledge and awareness of the long-term risks of smoking (Flay, 2009).

Overall, the results of this community service activity reinforce evidence from various previous studies and community service activities that participatory, visualization-based, and direct involvement educational strategies are effective in increasing students' knowledge, awareness, and critical attitudes towards the dangers of smoking. This activity not only contributes to improving students' knowledge about addictive and addictive substances in cigarettes but also has the potential to shape preventive skills, such as the ability to refuse peer pressure to smoke, that can be applied in their social lives. Therefore, this demonstration-based educational activity can be recommended as an effective educational intervention model in efforts to prevent smoking behaviour among junior high school students.

CONCLUSION

Educational activities on the dangers of smoking conducted at Adhyaksa Junior High School have proven to have a positive impact on increasing students' understanding of addictive and addictive substances in cigarettes. Through a series of structured educational activities, students are not only able to recognize harmful substances such as nicotine, tar, and carbon monoxide, but also understand the mechanisms of the impact of these substances on the body's health. Students' understanding includes the difference in health risks experienced by active and passive smokers, so that students realize that smoking not only harms themselves but also others around them.

An educational approach that combines simple practical exercises, visual demonstrations, and interactive discussion and question-and-answer sessions has proven effective in fostering active student participation during the activities. Visual demonstrations using simple media provide a concrete picture of the accumulation of harmful substances from cigarette smoke, so that the abstract concept of the dangers of smoking can be understood more clearly by students. In addition, interactive discussions encourage students to think critically, ask questions, and reflect on the short- and long-term health effects of smoking. This condition shows that experience-based and active participation education methods are more effective than one-way counselling approaches in increasing adolescent health awareness.

Based on the results of these activities, it is recommended that the cigarette danger education program be implemented continuously and expanded in scope, both in other classes at Adhyaksa Junior High School and in other schools with similar characteristics. The expansion of this program is expected to have a broader impact on efforts to prevent smoking behaviour among adolescents. In addition, integrating smoking hazard material into the school curriculum, particularly in relevant subjects such as Natural Sciences or Physical Education and Health, can be a strategic step to strengthen students' knowledge and health awareness on an ongoing basis.

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