

## DEVELOPMENT OF TOBACCO CONTROL EDUCATIONAL MATERIALS: POSTERS AND NOTEBOOKS AMONG ADOLESCENTS IN NIGERIA

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### ABSTRACT

**Background:** Tobacco use is a leading preventable cause of morbidity and mortality and poses a significant burden on fragile health systems in low- and middle-income countries (LMICs), including Nigeria. Adolescents are particularly at risk of starting to use tobacco due to factors such as misinformation and insufficient knowledge about its harmful effects. There is an urgent need for culturally appropriate, acceptable, and sustainable interventions to enhance knowledge, correct misconceptions, and promote positive behavior change regarding tobacco use.

This study describes the development and validation of culturally tailored, Health Belief Model (HBM)-based educational materials (posters and notebooks) for tobacco-related health education among adolescents in Nigeria.

**Methodology:** The Design-Based Research (DBR) approach was used to develop posters and notebooks featuring tobacco-related messages. These messages were adapted from the World Health Organization's (WHO) Tobacco Control Manual for Schools, based on the HBM constructs, and tailored to fit the Nigerian context. The materials underwent validation through reviews by a multidisciplinary panel of experts who assessed their clarity, cultural relevance, and theoretical alignment. Subsequently, they were pre-tested among 150 adolescents from public and private schools in Ibadan, Nigeria. Feedback from the adolescents guided iterative refinements, culminating in the development of the final versions of the materials.

**Results:** The educational materials conveyed information on different tobacco forms, the harmful constituents, health effects, and skills to avoid tobacco use. Expert reviewers confirmed the materials' alignment with HBM constructs. Participants in the pre-test rated the materials highly, with 89.3% describing the information as "very good" and 80.7% supporting their integration into the school curriculum.

**Conclusion:** The tobacco control educational posters and notebooks were found to be contextually appropriate and addressed gaps in tobacco-related knowledge and behavior change strategies. They offer a scalable model for school-based interventions in LMICs and could contribute to broader public health education efforts.

**Keywords:** Africa, Health-promoting schools, Smoking cessation, Teenagers, Tobacco prevention

### INTRODUCTION

Globally, tobacco use causes over eight million deaths annually, the majority occurring in low- and middle-income countries (LMICs), including Nigeria.<sup>1</sup> Tobacco use in Nigeria remains a public health problem, particularly among adolescents, with prevalence estimates ranging from 0.2% to 32.5%.<sup>2,3</sup> Adolescents are particularly vulnerable to tobacco use uptake, with most adult smokers initiating tobacco use during adolescence.<sup>4-6</sup> Several factors promote tobacco use initiation, including insufficient knowledge of its health risks, perception of tobacco use as normal, lack of resistance skills, low refusal self-efficacy, prior use or intention to use, and the belief that tobacco use is

glamorous.<sup>7-9</sup> Addressing these factors requires sustainable, cost-effective interventions tailored to the local context.

Tobacco-related health education improves knowledge and reshapes perceptions, reduces susceptibility, intention to use, and eventual uptake of tobacco.<sup>10-12</sup> Effective interventions often use behavioral models such as the Health Belief Model (HBM), which emphasizes key constructs like perceived risks, benefits, barriers, severity, cues to action, and self-efficacy.<sup>13</sup> HBM-based educational interventions have been successfully used to reduce the prevalence of

tobacco use<sup>14</sup>, including improving the knowledge, attitudes, and intention to quit tobacco use among school-going adolescents in Nigeria.<sup>15</sup>

Health education can be delivered through various methods, including expert-led sessions, teacher-led initiatives, peer-led approaches<sup>16</sup>, and other strategies such as the use of songs and folktales.<sup>17–19</sup> Additionally, self-directed learning is increasingly recognized as a valuable method, enabling individuals to independently engage with structured educational materials.<sup>20</sup> Some of the common educational materials used in health-related interventions are posters and notebooks. Posters and notebooks are particularly useful as visual aids for lectures, enhancing retention and engagement. Both offer an innovative approach to self-directed learning, empowering individuals to access and revisit critical health messages at their own pace. This makes them versatile tools for health education interventions. It would then be of immense benefit if these two educational materials could be developed suited to tobacco control among adolescents who are vulnerable based on local context and validated by experts and the target audience for their suitability before use in an intervention.

This study documents the development of educational posters and notebooks designed to address tobacco use among adolescents in Nigeria as part of an educational intervention on tobacco control.

## METHODOLOGY

**Study Design:** The Design-Based Research (DBR) approach was employed to develop educational materials (posters and notebooks) for tobacco-related health education among adolescents in Nigeria. DBR combines iterative development, real-world testing, and refinement to ensure the materials are both theoretically grounded and contextually relevant.<sup>21,22</sup>

The process was implemented in phases, starting with problem identification and the adaptation of existing resources to fit the cultural and social contexts of Nigerian adolescents. Messages were developed based on HBM, leading to the creation of initial versions of the materials. Subsequent phases involved expert validation, pre-testing among adolescents, and iterative refinements based on feedback, culminating in the production of finalized materials.

### Development of Educational Materials and Theme for the Tobacco Prevention Initiative

The content of the materials was adapted from the WHO's Tobacco Control Manual for Schools<sup>23</sup> and refined to reflect the cultural and educational context of Nigerian adolescents, drawing insights from

previous studies.<sup>2,5,31–33,15,24–30</sup> The topics covered various forms of tobacco, its harmful constituents, oral and general health effects, secondhand smoke, misleading advertisements, and decision-making skills for avoiding tobacco.

In alignment with the constructs of the HBM, the messages were carefully designed to address key behavioral determinants. For example, **Perceived susceptibility**: “Smoking cigarettes, using tobacco, and inhaling secondhand smoke can cause diseases in EVERY part of your body.”

**Perceived severity**: “Tobacco smoking kills half of its users.”

**Perceived benefits**: “Say yes to a healthy and productive life.”

**Self-efficacy**: “Believe in yourself to say no to smoking or tobacco use: you can avoid smoking if you decide to do so.”

**Cues to action**: The statement “Anytime you think about smoking, think about oral cancer, think about premature death” serves as an internal cue, prompting adolescents to reflect on the consequences of tobacco use whenever they consider engaging in it. Additionally, the posters and notebooks act as external cues, providing frequent visual reminders to avoid or quit tobacco use.

These messages were subsequently developed into four variants of posters using visually engaging graphics and concise, impactful messages, each tailored to a specific theme related to tobacco education. Similarly, the notebooks featured the same messages and graphics on their front and back covers, presenting tobacco-related information in simple and engaging formats.

Pictures and graphics were carefully selected and designed to elicit a sense of disgust among adolescents. This approach is grounded in evidence from studies<sup>34,35</sup> indicating that antitobacco advertisements featuring high-fear and disgust-eliciting imagery are significantly more effective in capturing attention and motivating behavioral change.

The theme “**Say No to Tobacco**” was adopted for the project, accompanied by a custom-designed logo featuring a “**thumbs-down**” symbol to signify disapproval of tobacco use. (Figure 1) This theme and logo serve as the branding identity.<sup>36</sup> The theme was chosen for its simplicity, relatability, and ability to convey a clear, memorable, and action-oriented message that resonates with adolescents. By summarizing the core messages, it serves as a strong visual and linguistic anchor for the intervention, ensuring consistency and reinforcing the intended objectives.

To reinforce campaign cohesion and recognition, the logo and theme were consistently placed on all four posters and notebooks. This strategic branding ensures that even when the materials are encountered individually, adolescents can easily associate them as part of the same “Say No to Tobacco” initiative. The goal was to create a unified visual identity that enhances recall, fosters engagement and encourages repeated exposure to the message across multiple formats.



**Figure 1:** Logo for the tobacco educational intervention program among adolescents in Nigeria.

### Validation and Refinement of Materials

Face validity and construct validity were done by experts in tobacco control, health education, community dentistry, and schoolteachers who reviewed the materials. The experts assessed the clarity, cultural relevance, alignment with HBM constructs, and overall suitability of the materials for adolescents. These experts were carefully selected based on their extensive experience in tobacco control and HBM-based educational interventions. Their feedback was used to refine the materials by simplifying medical jargon, enhancing visual appeal, and ensuring cultural appropriateness. The variabilities in their feedback were addressed through iterative discussions and consensus building.

### Pre-testing and Feedback from Adolescents

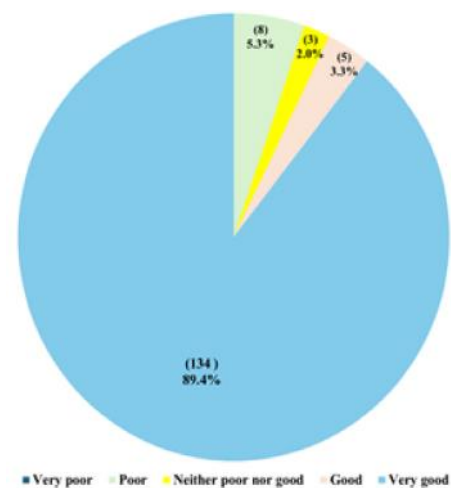
Subsequently, the materials (Appendices A – D) were pre-tested among 150 adolescents from one public and one private school in Lagelu Local Government Area in Ibadan, Nigeria. The schools and participants were purposively selected for accessibility and representation of the target demographic: secondary school adolescents attending both public and private schools. Each participant received a notebook, and the posters were displayed on classroom walls. The students reviewed the materials and provided both written and verbal feedback on their clarity, attractiveness, and comprehensibility. They also assessed the usefulness and relevance of the materials. They were asked to rate the materials’ usefulness on a scale of 0

(not useful) to 10 (most useful), rate the quality of messages contained in them using a 5-point Likert scale (ranging from “very poor” to “very good”), and indicate whether tobacco-related education should be included in their school curriculum (3-point Likert scale: Agree, Neutral, Disagree).

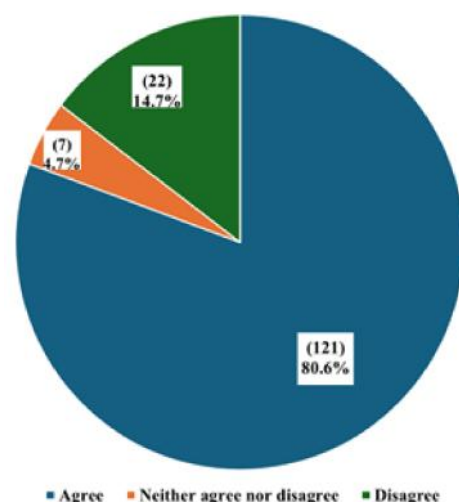
### Results of the Pre-test and Refinement of Materials

#### *Feedback on the clarity, attractiveness, and comprehensibility of the materials.*

Suggestions made by the adolescents included incorporating more images depicting different tobacco forms and illustrating the oral and general health effects of tobacco use. Based on this feedback, further adjustments were made to the design, layout, and content, including adding images of health consequences and simplifying the text to cater to varying literacy levels.



**Figure 2:** Participants’ ratings of the tobacco-related information presented in the educational materials (posters and notebooks)



**Figure 3:** Participants’ attitudes toward the inclusion of tobacco-related content in their curriculum

### ***Evaluation of usefulness and relevance of the materials***

The results of their responses were as follows: The mean ( $\pm$ standard deviation) Usefulness rating score was 9.85 ( $\pm$ 0.71) out of 10; 89.3% rated the information provided as “very good” (Figure 2), and 80.7% agreed that tobacco-related programs should be included in their curriculum. (Figure 3)

The qualitative feedbacks from participants were categorized into three key themes: Positive Feedback, Enhancing Tobacco-related Awareness Campaigns, and No Suggestions. (Table 1) The Positive Feedback

### **DISCUSSION**

This study highlights the development of posters and notebooks designed for tobacco control interventions among Nigerian adolescents. The innovative use of notebooks customized with tobacco-related messages represents a novel approach to health education. To our knowledge, this is the first study to integrate health-focused content into notebooks specifically tailored for adolescents. The findings demonstrate the high acceptability and relevance of these materials, providing a strong foundation for their integration into broader adolescent health education initiatives,

**Table 1:** Themes, sub-themes, supporting quotes, and authors’ interpretations of the qualitative feedback from participants in the pre-test.

Theme	Subtheme	Authors’ Interpretation	Supporting Quotes
<b>Enhancing Tobacco-related Awareness Campaigns</b>	<b>Expanding to Other Locations</b>	Emphasis on reaching more schools and locations to spread the tobacco education message.	“Go to other schools too.” “Pass the posters to other schools.”
	<b>Utilizing Mass Media</b>	Suggestions to use TV, radio, and other mass media for broader awareness.	“I think the anti-tobacco messages should be shown more frequently on TV stations.”
	<b>Public Campaigns and Billboards</b>	Calls for visible campaigns like billboards to create public awareness about tobacco.	“Announcing it on mass media.” “There should be a billboard against tobacco.” “By posting on billboards to create awareness.”
<b>Positive Feedback</b>		Positive remarks on the materials without specific suggestions for improvement.	“Very good.” “Your posters are very good.”
<b>No Suggestions</b>		Responses indicate no specific feedback or uncertainty.	“Nothing.” “I don’t know.”

theme highlighted participants’ appreciation for the quality of the materials, with no additional suggestions for improvement. Under the theme of Enhancing Tobacco-related Awareness Campaigns, participants emphasized the need to expand the program to other schools and leverage mass media, such as TV and radio, to enhance visibility and awareness. They also proposed public campaigns and billboards as additional strategies to reinforce tobacco-related messaging. Finally, a significant number of responses fell under No Suggestions, indicating either uncertainty or the absence of specific feedback. These insights were instrumental in guiding iterative refinements to the intervention materials and delivery approaches.

### **Finalization of the materials**

The finalized posters and notebooks (Appendices E – J) were produced in high quality. The materials were printed in sufficient quantities to support planned interventions in schools.

particularly by health promotion and tobacco control experts.

Experts emphasize that the effectiveness of tobacco control messaging largely depends on its content.<sup>37</sup> Recommendations include combining supportive information on quitting with direct, succinct, and impactful messages, such as “Smoking kills” in bold, prominent text.<sup>35,37</sup> This approach closely aligns with the strategies used in developing the posters and notebooks in this study. Evidence further highlights the effectiveness of comprehensive and visually engaging health warnings in increasing knowledge, shaping perceptions of risk, and promoting smoking cessation. Among youths, these warnings have shown significant potential in preventing smoking initiation, making them a critical component of adolescent-focused tobacco control efforts.<sup>35,37</sup>

Both gain-framed messages, such as emphasizing the benefits of avoiding tobacco, and loss-framed messages, such as highlighting the consequences of smoking, were incorporated into these materials. Reports suggest that adolescents may respond differently to these frames depending on their tobacco use status.<sup>38–41</sup> Those intending to start or already addicted to tobacco often respond better to negatively framed messages, while individuals with lower tobacco dependence or attempting to quit are more influenced by gain-framed messages that emphasize the benefits of cessation.<sup>38–41</sup> This mixed framing ensures that these materials address the diverse psychological profiles and motivations of adolescents, making them suitable for both preventing tobacco uptake and encouraging cessation.

The initial version of the posters (Appendix D) included anti-industry themes designed to arouse a sense of rebellion among adolescents against the tobacco industry. However, this emphasis was not obvious in the final version of the materials due to space constraints. Some experts have suggested that anti-industry messaging resonates strongly with adolescents, as it aligns with their inclination to challenge authority.<sup>37</sup> We recommend that future studies evaluate the significance of incorporating anti-industry themes in tobacco education for Nigerian adolescents. Additionally, educators using these materials to support their interventions may consider emphasizing anti-industry messaging during their sessions.

Tobacco-customized posters are essential aids for adolescent health interventions. They offer cost-effective, scalable solutions to overcome barriers such as the shortage of experts in tobacco cessation and the logistical challenges of experts reaching all schools. Unlike time-bound health talks, posters provide continuous, passive education, fostering long-term knowledge retention and empowering adolescents to make informed decisions, even in resource-constrained settings.

As daily-use school supplies, notebooks provide repeated exposure to health messages, reinforcing knowledge and promoting behavior change over time. This approach also has significant scalability potential, as many national and subnational governments and Non-Governmental Organizations (NGOs) usually distribute free notebooks to students. Incorporating health messages adds minimal cost, making it a highly cost-effective and widely adoptable strategy.

The posters and notebooks were developed through a rigorous, evidence-based process grounded in HBM principles. Key constructs such as perceived

susceptibility, severity, benefits, cues to action, and self-efficacy were addressed. The fact that it was adapted from the WHO Tobacco Control Manual for Schools and suited the Nigerian context, ensured its cultural relevance. Feedback from a multidisciplinary panel of experts and pre-testing with 150 adolescents helped refine the materials for clarity, visual appeal, and contextual appropriateness, enhancing their potential for real-world effectiveness.

Despite its strengths, the study has some limitations. The messaging placed less emphasis on the “perceived barriers” construct of the HBM and anti-industry themes, which may represent areas for improvement. However, there is no evidence suggesting this diminishes their overall effectiveness. Self-reported feedback may have introduced self-reported bias, although anonymity and the absence of inducements are likely to have minimized this risk. Additionally, pre-testing was limited to two schools in Ibadan, which may affect generalizability. Nevertheless, the materials’ design was informed by comprehensive literature from across Nigeria and the globally recognized WHO manual, supporting their broader applicability.

Future studies should evaluate the materials in diverse settings across Nigeria and Africa to determine their effectiveness in improving adolescents’ knowledge, attitudes, harm perceptions, and behaviors related to tobacco use. Intervention studies are needed to assess their long-term impact on tobacco prevention and cessation outcomes.

## CONCLUSION

This study highlights the successful development and validation of culturally tailored, HBM-based educational materials for tobacco use prevention among adolescents in Nigeria. The materials demonstrated high acceptability and good alignment with the needs and preferences of the target audience. By addressing gaps in knowledge, perceptions, and behavior change strategies related to tobacco, these materials provide a scalable, and sustainable model for health education in Nigeria and countries with similar contexts.

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**Conflict of Interest:** The authors declare no conflict of interest.

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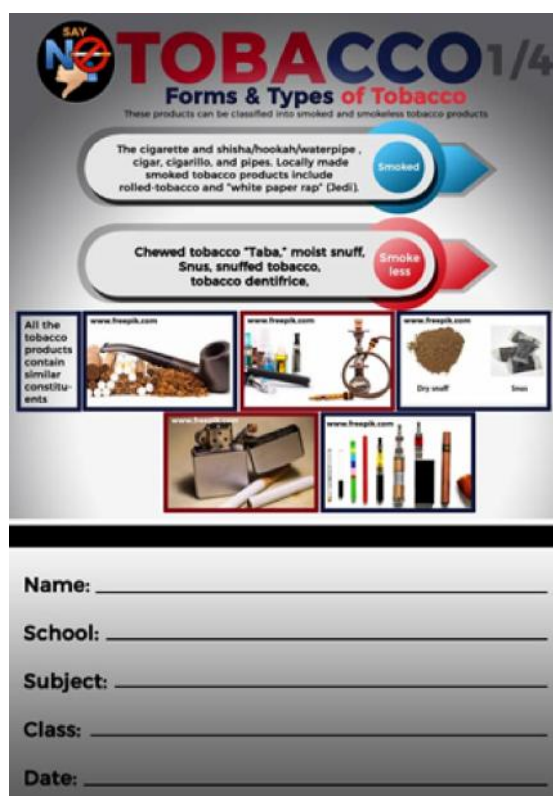
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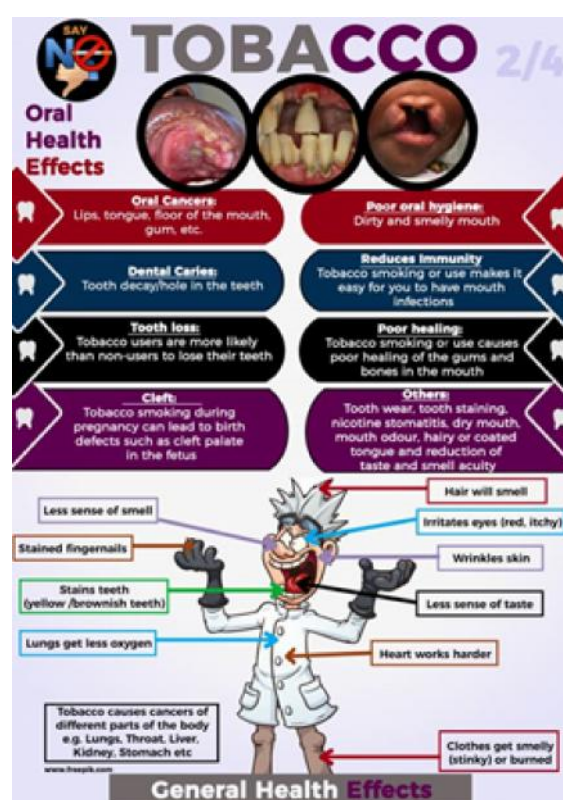
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**Appendix A:** Initial design of the outer page of the notebook front cover and first poster for tobacco educational materials



**Appendix B:** Initial design of the inner page of the notebook front cover and second poster for tobacco educational materials



**Appendix C:** Initial design of the inner page of the notebook back cover and third poster for tobacco educational materials



**Appendix D:** Initial design of the outer page of the notebook back cover and fourth poster for tobacco educational materials





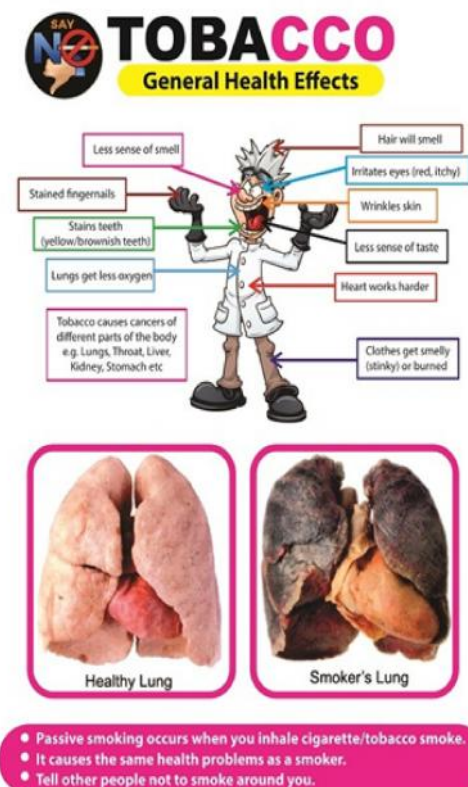
**Appendix E:** Final design of the outer page of the notebook front cover and first poster for tobacco educational materials



**Appendix F:** Final design of the inner page of the notebook front cover and second poster for tobacco educational materials



**Appendix G:** Final design of the inner page of the notebook back cover and third poster for tobacco educational materials



**Appendix H:** Final Design of the Outer Page of the Notebook Back Cover and Fourth Poster for Tobacco Educational Materials



## Appendix I: Final design of the writing pages of the notebooks for tobacco educational materials

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