

UNIVERSITI TEKNOLOGI MARA

**DESIGN, DEVELOPMENT, UTILITY
AND USABILITY TESTING OF THE
FrESH (FREE FROM E-
CIGARETTES AND SMOKING FOR
HEALTH) WEB APPLICATION**

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Thesis submitted in fulfilment
of the requirements for the degree of
**Master of Medicine
(Family Medicine)**

Faculty of Medicine

November 2025

ABSTRACT

Background: The prevalence of tobacco and electronic cigarettes among adolescents presents an ongoing public health concern, primarily due to the early onset of nicotine dependence. However, digital interventions to support smoking cessation in this population remain scarce. The FrESH (Free from E-cigarette and Smoking for Health) Web App was developed as part of the Stop Nicotine Addiction Among Secondary School Students (SNAASSS) © programme, a peer-led intervention, to provide digital support for adolescent smoking cessation. This study aimed to design, develop, and evaluate the FrESH Web App through expert utility testing and adolescent usability testing.

Methodology: Phase 1 involved the design and development of the FrESH Web App using an iterative model of the Software Development Life Cycle (SDLC) framework. Phase 2 consisted of a qualitative evaluation via utility testing with six medical and digital experts and usability testing with 14 adolescent smokers, using in-depth interviews and cognitive task analysis.

Results: Utility testing confirmed the app's relevance and alignment with smoking cessation goals, while highlighting areas for improvement, such as simplifying language, enhancing navigation, and refining input fields. Usability testing indicated the app was engaging, visually appealing, and motivating for adolescents. However, issues emerged with content comprehension, form clarity, and lack of interactive features.

Conclusions: The FrESH Web App demonstrates strong potential to complement the SNAASSS© programme and is engaging for adolescents. However, refinements are needed to improve user comprehension, enhance interactive elements and strengthen motivational features. These insights will inform the next development cycle to optimise usability and maximise impact for adolescent users.

ACKNOWLEDGEMENT

In the name of Allah, the Most Gracious, the Most Merciful.

All praise is due to Allah for granting me the strength, clarity, and perseverance to complete this thesis.

My sincere thanks to Associate Professor Dr. Suraya Abd Razak, whose guidance has accompanied me from the first step of this research until its final stage. Her insight, encouragement, and unwavering support have carried me through every challenge. I am also sincerely grateful to my co-supervisors, Dr. Nik Munirah Binti Nik Mohd Nasir, Professor Dr Sazzli Shahlan Kasim, Dr Hayatul Najaa Miptah and Dr. Lina Lohshini Kanoo, for their thoughtful feedback, dedication, and commitment in assisting me throughout this journey.

I extend my heartfelt gratitude to the lecturers and staff of the Department of Primary Care Medicine, Universiti Teknologi MARA (UiTM), whose guidance and support have greatly enriched my learning experience. My sincere thanks also go to the Family Medicine Specialists at my clinic
, for their mentorship, encouragement, and invaluable insight..

Finally, my deepest gratitude belongs to my beloved husband,
whose patience, support, and understanding made this journey bearable. My parents,
my parents-in-law, my siblings, and my daughters,
. Their prayers, patience, and unwavering emotional support have been my anchor and source of strength. This achievement would not have been possible without their constant encouragement.

May Allah reward each of you abundantly for your kindness, support, and faith in me.

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CHAPTER ONE: INTRODUCTION

Tobacco use remains one of the most preventable causes of disease and death worldwide. Globally, approximately 38 million adolescents aged 13–15 years are current users of tobacco, representing about 10% of this age group (1). In Malaysia, e-cigarette use among secondary school students increased from 9.8% in 2017 to 14.9% in 2022 (2). This shift in adolescent nicotine consumption patterns signals the need for interventions that address the evolving landscape of tobacco and nicotine use.

Tobacco products expose users to thousands of toxic substances, including chemicals that cause cancer, cardiovascular disease, and chronic lung conditions (3). These risks are especially concerning for adolescents, as exposure to tobacco smoke during this developmental period has been shown to impair lung growth and contribute to mild airway obstruction (4), while nicotine disrupts brain maturation and rapidly promotes dependence even with low levels of use (5). The increasing preference for e-cigarettes among adolescents is attributed not only to misperceptions of reduced harm compared to conventional cigarettes but also to the appeal of flavoured products, which have been shown to increase interest in use and complicates cessation efforts (6). In addition to long-term risks, adolescent e-cigarette use has been linked to serious acute lung injuries, including E-cigarette or Vaping-Associated Lung Injury (EVALI), which led to thousands of hospitalizations, many involving adolescents and young adults, in the United States during the 2019–2020 outbreak, highlighting the urgent need for prevention strategies (7).

These long-term and emerging acute health risks have prompted global and national action. In response, Malaysia has aligned with the World Health Organization's Framework Convention on Tobacco Control (WHO FCTC) through initiatives such as pictorial health warnings on cigarette packs, bans on tobacco advertising and promotion, smoke-free zones in public places, and increased excise duties on tobacco product (8). The Generational End Game (GEG) clause in Malaysia's Control of Smoking Products for Public Health Bill 2022 sought to prohibit the sale of tobacco and vape products to individuals born on or after 1 January 2007, but was excluded from the final 2023 bill following legal and policy debates over its constitutionality and feasibility (9). Considering these gaps, digital health interventions can serve as valuable tools to complement policy measures and behavioural support in helping adolescents overcome nicotine addiction. This is