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Development of a Mobile App for Smoking Cessation: a Qualitative Study

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Abstract

Smoking is a public health concern in Indonesia. A challenge facing Indonesian healthcare system is that the use rate of in-person smoking cessation counseling is low due to smokers' concerns about their privacy. This challenge has limited the ability of Indonesian health researchers and policy makers to develop and implement evidence-based practices to prevent smoking. The development of digital technologies in Indonesia has offered various opportunities to address this issue. Mobile devices are ubiquitous in Indonesia and have the potential to deliver counseling services for smokers. This study was part of the Mobile Application System for Smoking Cessation program and aimed to investigate the culturally-tailored features of mobile apps to prevent smoking in Indonesia. Data were collected through structured interviews and Focus Group Discussions (FGDs) among Indonesian policy makers and experts from universities and NGOs. We also reviewed relevant documents recommended by participants. We found that to develop a culturally-tailored mobile app for smoking cessation in Indonesia, it is important to understand smokers' characteristics, smoking status, smoking behavior, and level of motivation to quitting smoking. We also found that following the World Health Organization's 5A (Ask, Assess, Advise, Assist, Arrange) and 5R (Relevance, Risk, Reward, Roadblocks, Repetition) strategies is a key to improve the feasibility and acceptability of a smoking-cessation mobile app. App-based interventions need to be integrated with the practices performed by counselors and health workers and should be easily accessed by smokers.

INTRODUCTION

Smoking is a modifiable risk factors to many non-communicable diseases (NCD), including stroke, coronary heart disease, chronic obstructive pulmonary disease, and trachea, bronchus and lung (TBL) cancer. Studies have reported that global smoking prevalene decreased from 22.7% in 2007 to 17% in 2021, but in many countries there was an inrease in prevalence. Globally, at least 940 million men and 193 million women ages 15 or older were current smokers in 2019 (The Tobacco Atlas, 2023). In 2019, over 8 million people died from a tobacco-related disease (World Health Organization, 2021). Each year, smoking or tobacco-related disease causes 225,700 deaths in Indonesia (World Health Organization, 2020).

The Global Youth Tobacco Survey (GYTS)

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found that 35.6% and 3.5% of Indonesian male and female youths currently used any tobaco products, then 35.5% and 2.9% of Indonesian male and female youths currently smoked tobaco (Centers for Disease Control and Prevention, 2021). The global smoking population increases every year. The latest national health survey conducted by the Health Research and Development Agency of the Ministry of Indonesia showed that the prevalence of smoking among adolescents has increased from 7.2% in 2013 to 9.1% in 2018 (Badan Penelitian dan Pengembangan Kesehatan Kementerian Republik Indonesia, 2018).

The increased number of smokers and the early age of smoking initiation are public health concern. Studies estimate that every day there are about 2,100 adolescents become smokers, and 90% of the smokers started smoking before 18 years old (World Health Organization, 2015). Adolescent smokers are more likely to continue their smoking habit into adulthood (Britton, 2004), therefore, developing interventions to prevent smoking habit among adolescents is a necessary step to reducing smoking.

To prevent smoking, the World Health Organization through the Framework Convention on Tobacco Control (FCTC) formulated a strategy called MPOWER, which stands for monitoring tobacco use, protecting people from tobacco smoke, quitting tobacco, warning about the dangers of tobacco, enforcing tobacco advertising, promotion & sponsorship bans, and raising taxes on tobacco. The MPOWER strategy provides a foundation for tobacco control (World Health Organization, 2023). Based on the MPOWER strategy, Ministry of Health of the Republic of Indonesia recommended to help smokers quit smoking through counseling at healthcare services (Ministry of Health of the Republic of Indonesia, 2011). Research have found that smoking cessation counseling interventions are effective in helping people quit smoking (U.S. Department of Health and Human Services, 2012).

Quitting smoking is challenging because of nicotine addiction. Nicotine addiction is one of the biological and physiological aspects that hinder smoking cessation. Nicotine ranks first for causing death compared to four other substances including cocaine, morphine, caffeine and alcohol. Many smokers continue to smoke because of nicotine addiction which is demonstrated by the high prevalence of smoking recurrence (Robinson et al., 2020).

Mobile health (mHealth) interventions through smartphones for adolescents have increased in the past several years (Gulliver et al., 2015). These interventions have the potential to reach a large number of youth audience because nearly 75% of adolescents have access to smartphones, and 94% of adolescents access to the internet via smartphones every day (Lenhart et al., 2015). More importantly, mHealth intervention can help adolescents overcome geographic barriers and protect adolescents' privacy by avoid exposing to their friends and parents (Mermelstein., 2003). Central Statistics of Indonesia found that 67,88% of Indonesians own gadgets. This number increased by 2,01% from the previous year (Central Statistics of Indonesia, 2023). APJII (Association of Internet Service Providers Indonesia) explained that 215,63 million people of Indonesian (78,19%) are internet user in 2022 – 2023 (Ministry of Communication and Information, 2023). Then study conducted by Ministry of Communication and Information in Indonesia and funded by World Health Organization found that 98% of adolescent in Indonesia knew about the internet and 79,5% were internet users (Ministry of Communication and Information, 2014).

Mobile health (mHealth) has many advantages such as can be used anywhere at any time, cost-effective, can send tailored messages according to user characteristics, can deliver different messages according to time and location, can offer support for tobacco cravings, and provide social support (Barroso-Hurtado et al., 2021). Given the immense potential of mHealth in preventing smoking, in 2016, the Ministry of Health of the Republic of Indonesia developed the Smoking Cessation Effort Program and published it in the Technical Guidelines for Quitting Smoking in Primary Health Care Facilities.

Mobile health (mHealth) solutions emerge to improve smoking cessation treatments (Carrasco-Hernandez et al., 2020). Participants who received only regular treatment were 5,40 times more likely to continue smoking compared to those who underwent treatment with the mobile app of smoking cessation (95% CI = 1.35; 20.15) (García-Pazo et al., 2021). Under this background, Universitas Airlangga collaborated with software engineers and developed a mobile app for smoking cession. The purpose of this study is to conduct formative research to collect data for developing a mobile app that can be used in Indonesia for smoking cessation.

METHOD

This research is qualitative research with a formative study design and used a system approach which is system analysis and system design.

Formative research is used for information and fact-finding, using scientific methods conducted before the start of the program (Titis Gandariani, 2019). In this research, formative study is used as part of the system analysis to identify the data and information that are needed to develop Mobile Application System for Smoking Cessation. System analysis is carried out as a stage to describe the current system, identify data and information needs for the development of information systems related to smoking cessation in system design. The data collected during the system analysis stage is expert judgment from informants based on the study, expertise, and experience of informants related to smoking cessation.

The variables in this study are the type of data, input entities (data sources), recording flow and reporting flow, information generated, and output entities (information users). This study was conducted from March to December 2020. This researchrecruited participants using convenience sampling. The participant of this research were Indonesian policy makers, experts from universities, and NGOs. The eligibility criteria of participants were 1) experts on smoking cessation, 2) participated in smoking cessation programs, or 3) people who are responsible for smoking cessation programs in Indonesia.

The research instruments used were indepth interview guidelines, FGD guidelines and observational sheets. The data was collected through indepth interview and Focus Group Discussion (FGD). The informant of indepth interview were Center of Health Behavior and Promotion (CHBP) UGM as experts from universities and Green Crescent as NGOs. The instrument for indepth interview were develop to capture detailed information including potential data and information on smoking cessation that would be suitable for a mobile app. Then the FGD participants were 9 respondents who are responsible in smoking cessation efforts in Indonesia and documentary studies. The method for selecting participants for FGD is purposive or convenience sampling to select those members of the community who will able to provide the best information. The eligibility criteria for the informant are the persons from units or institution that have tasks as the responsible for tobacco control including smoking cessation. The considerations on selecting the FGD participants are based on the positions as policy makers, tobacco control experts and practitioners.

The FGD has been led by researchers and was recorded and transcribed in Indonesian language. Researchers independently analyzed the transcript using method that was adapted from the constructing grounded theory concept of practical guide through qualitative analysis and adjusted based on the situation of the research (Kathy Charmaz, 2006)Data were inductively analyzed drawing from aspects of grounded theory, an approach which applies an iterative strategy of working through the data set, using comparative methods, and intimate interaction with the data to generate theory. Based on the FGD, we also collected some commonly used questionnaires on smoking cessation in Indonesia from Ministry of Health of the Republic of Indonesia (2011) and analyzed the key themes of these questionnaires.

After the FGD, we conducted a documentary study to investigate three published smoking cessation guidelines in Indonesia, including 1) Technical Instructions for Quitting Smoking in Primary Health Care Facilities from the Ministry of Health of the Republic of Indonesia, 2) Center of Health Behavior and Promotion (CHBP) from Universitas Gadjah Mada, and 3) Smoking Free Guidebook: You Can Quit Smoking, We Show You How from Green Crescent Indonesia. Specifically, we summarized the variables those smoking cessation platforms reported. The data collected from FGD and documentary studies were analyzed descriptively. Data collected from indepth interviews, FGDs, and document studies were analyzed descriptively to produce a system flow. System flow is described through context diagrams and Data Flow Diagrams (DFD). To reduce the bias during the analysis process, researchers have triangulated data by comparing the results of indepth interviews and FGDs with the results of document studies.

RESULT AND DISCUSION

Respondents in this study were 9 people consisting of 5 women (55.6%) and 4 men (44.4%). 2 respondents came from the Ministry of Health of the Republic of Indonesia, 1 person from the East Java Provincial Health Service, 1 person from the Surabaya City Health Service, 2 people from CHBP UGM, 2 people from Green Crescent, and 1 person from the East Java Consumer Protection Foundation.

Result

Existing Smoking Cessation Systems

Various smoking cessation programs have been carried out by the Ministry of Health together with educational institutions and private clinics. The Ministry of Health has developed smoking cessation services in the health centers since 2014. The smoking cessation module was

developed by the Ministry of Health in collaboration with the Indonesian Pulmonary Doctors Association and psychiatry doctors as smoking cessation counselors (Ministry of Health of the Republic of Indonesia, 2011). The smoking cessation counselors are health workers who include doctors, health promoters, nurses, and midwives. The Ministry of Health has also developed a toll-free hotline for smoking cessation services, the hotline number is 0-800-177-6565 (Ministry of Health of the Republic of Indonesia, 2022). Every Indonesian citizen are able to have chance to call the service for counseling or just to gain information about smoking.

The smoking cessation program is carried out by CHBP UGM by opening counseling in pulmonary medicine clinics since 2013. CHBP smoking cessation also conducts smoking cessation training using the 5A (Ask, Assess, Advise, Assist, Arrange) & 5R (Relevance, Risk, Reward, Roadblocks, Repetition) methods. During the Covid-19 pandemic, smoking cessation counseling is carried out via WhatsApp and calls. The smoking cessation program conducted by Green Crescent began with an understanding of why clients want to quit smoking. This is associated with Motivational Enhancement Therapy (MET) which adjusts the reasons and prevention efforts. The smoking cessation program in Green Crescent also emphasizes education, considering that smoking behavior in adolescents is not a model of addiction but more of an obsession.

The obstacle of the condition is that only few people come for smoking cessation counseling at the health centers. The officer also cannot send a report because no one has come for counseling so nothing is reported. Another obstacle faced is the client who only comes to counseling once so that his behavior changes cannot be known. Counseling hours that are adjusted to the health centers 'opening hours are also felt to limit clients' time for counseling. The effort to overcome these obstacles is to carry out smoking cessation in an integrated manner. It's initially started by asking each patient about their smoking habits and advise them to go to smoking cessation services even though they are not forced to quit smoking. Through this effort, it is expected that the counselors will be able to socialize about smoking cessation with the hope that the patient will come back to join the smoking cessation program.The development of the smoking cessation method in the form of an application is expected to meet the behavior change strategy and be adjusted to the needs of the client. The application is expected not only to meet the needs of clients who do not want to quit smoking and want to know information about cigarettes, but also clients who are ready to quit smoking. This application can also be equipped with recording and reporting functions to record the development and changes in client behavior in smoking. The development of the smoking cessation method as an application may provide options for smoking cessation clients. The smoking cessation method is also expected to reduce face to face encounters that are beneficial for preventing the transmission of disease in emergencies condition such as pandemics or epidemics.

Smoking Cessation Strategy

The summary of the smoking cessation strategies is formulated from FGD and document studies in the modules are presented in Table 1. The recording and reporting format used in the prevention and control program of NCDs, which consist of Technical Instructions for Quitting Smoking in Primary Health Care Facilities from the Directorate of Prevention and Control of Non-Communicable Diseases from Directorate General of Disease Prevention and Control, Ministry of Health of the Republic of Indonesia (Ministry of Health of the Republic of Indonesia, 2011), Efforts to Quit Smoking Module from Center of Health Behavior and Promotion (CHBP) Universitas Gadjah Mada (Center of Health Behavior and Promotion (CHBP) UGM, 2013), and Smoking Free Guidebook: You Can Quit Smoking, We Show You How from Green Crescent Indonesia. In order to develop the strategies, our study showed that data and information that support the efforts of smoking cessation through mobile-based intervention consist of demographic characteristics of the clients, smoking status, addiction level, history of previous smoking cessation effort, smoking behavior, and motivation to quit smoking level. The mobile-based application should also provide the follow-up plan, including list of suitable counselors, counseling schedule, and clinical parameters regarding the accomplishment of smoking cessation efforts clients have achieved.

Table 1 contains information on methods and strategies for smoking cessation program sourced from the documentary study and interview related to the features for the smoking cessation application. These various methods and strategies need to be accommodated by the mobile application which will be developed through application features.

A Model of developing a mobile app for Smoking Cessation

This study suggested a model of develo-

Table 1. A summary of the smoking cessation strategies

No	Behavior Change Strategy		Suitable Features for The Aplication
a.	Information, Education and Communication (IEC) on the impact of cigarette consumption on health Smoking cessation strategies 1. Client identification: client type, smoker profile, level of addiction, assessing motivation 2. Evaluation and motivation 3. Determination the treatment options that will be given: non-pharmacology, pharmacology 4. Follow-up Types of smoking cessation: 1. Cold turkey: to withdraw from (an addictive substance or a habit) abruptly and completely 2. The delay way 3. Subtraction way 4. The 4T Approach: Ask, Analyze, Help, and Follow up Smoking cessation steps: 1. Welcome 2. Ask 3. Describe 4. Repeat Behavior change stage: 1. Precontemplation 2. Contemplation 3. Preparation 4. Action 5. Maintenance 6. Recycling, and 7. Relapse Rating: 1. Drop-out rate 2. Success rate 3. Reference level	a. b. c. d. e. f. g. h. i. j. k.	Counselor and Client Database Health media database, the dangers of smoking and smoking cessation program. The database is in the form of posters, flyers, and videos that can be accessed and downloaded by clients. Media can be embedded in existing social media applications such as YouTube and Instagram Screening form to ask about the client's characteristics, the client's smoking habit, the level of addiction and the client's motivation to quit smoking An interactive form containing a conditional questionnaire filled out by the client Face-to-face online counseling with flexible time (counseling schedule based on agreement between counselor and client) Counseling, communication and question and answer conducted through writing and face-to-face online Regular notifications containing motivational messages to quit smoking Counseling history which contains data about the counselor, client, time, messages that have been conveyed by the counselor, client responses and follow-up plans Digital form of recording and reporting the progress of the smoking cessation client's to the health office Client of smoking cessation progress dashboard Help: data entry by counselor
b.	Education, Information and Communication in adolescents: 1. Tobacco use in adolescents 2. Risk factors for initiating tobacco use 3. Tobacco burden and global tobacco control 4. Tobacco and occupational health 5. Passive smokers		

No	Behavior Change Strategy	Suitable Features for The Aplication
	Strategy 5A: 1. Ask: Do you smoke, how much, since when? 2. Advice: To give important reasons for quitting, linking patient disease or disease risk to smoking, educating patients about the relationship between smoking and disease, using visual images where possible so they can understand 3. Assess: Assessment of willingness to quit or readiness to quit or reduce smoking 4. Assist: Helping the patient to take action: discussing how to deal with withdrawal symptoms, negotiating a plan, if not ready to quit, try to motivate using the 5Rs 5. Arrange: Arrange a follow-up strategy, leave the door open for future discussion 5R motivation: 1. Relevance: Discuss with patients how to quit may be personally relevant to them. 2. Risks: Discuss with patients the short and long terms risks of smoking to them and their loved ones 3. Rewards: Discuss with patients the benefits / rewards of quitting smoking for one's own quality of life and as a model for those closest to them 4. Roadblocks: Identify all obstacles, how to get rid of them 5. Repetition: Summarize and repeat what patients have as their greatest personal motivators for quitting smoking and ways to overcome obstacles and obstacles to quitting	
c.	Knowledge about the dangers of smoking: 1. Health problems due to smoking 2. Effects on passive smokers 3. The impact of smoking on family and others 4. The impact of quitting smoking on health 5. Addiction to smokers 6. Control the surrounding environment 7. Get social support 8. Reward for quitting smoking Strategy: 1. Step 1: Quit according to the steps the clients made themselves 2. Step 2: Overcome the desire that drives the clients to smoke 3. Step 3: Use drugs to stop smoking in order to work properly 4. Step 4: Take control of the environment around the clients 5. Step 5: Get social support	

ping mobile apps for smoking cessation. When this research was conducted, the Indonesian Ministry of Health had not implemented an electronic application for smoking cessation. The recapitulation strategy in Table 1 shows the components involved in the smoking cessation

program. These components include counselors, clients, and the Department of Health as a health authority. The relationship between the entities in the mobile application is depicted in the Context Diagram. The context diagram of the mobile application concept for Efforts to Quit Smoking is presented in Figure 1. The context diagram shows that the box on the left as an input entity as a data source consisting of counselors and clients or participants as individuals who take part in the smoking cessation program. The data enters the application system and produces information that is used by the box on the right as the output entity or information user. The users of the information consist of counselors, clients, and the health office as the health authority in an area.

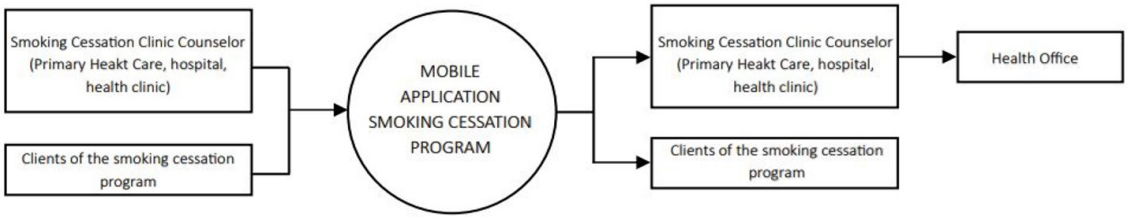

Figure 1. Context Diagram Concept of the Mobile Application for Smoking Cessation Program

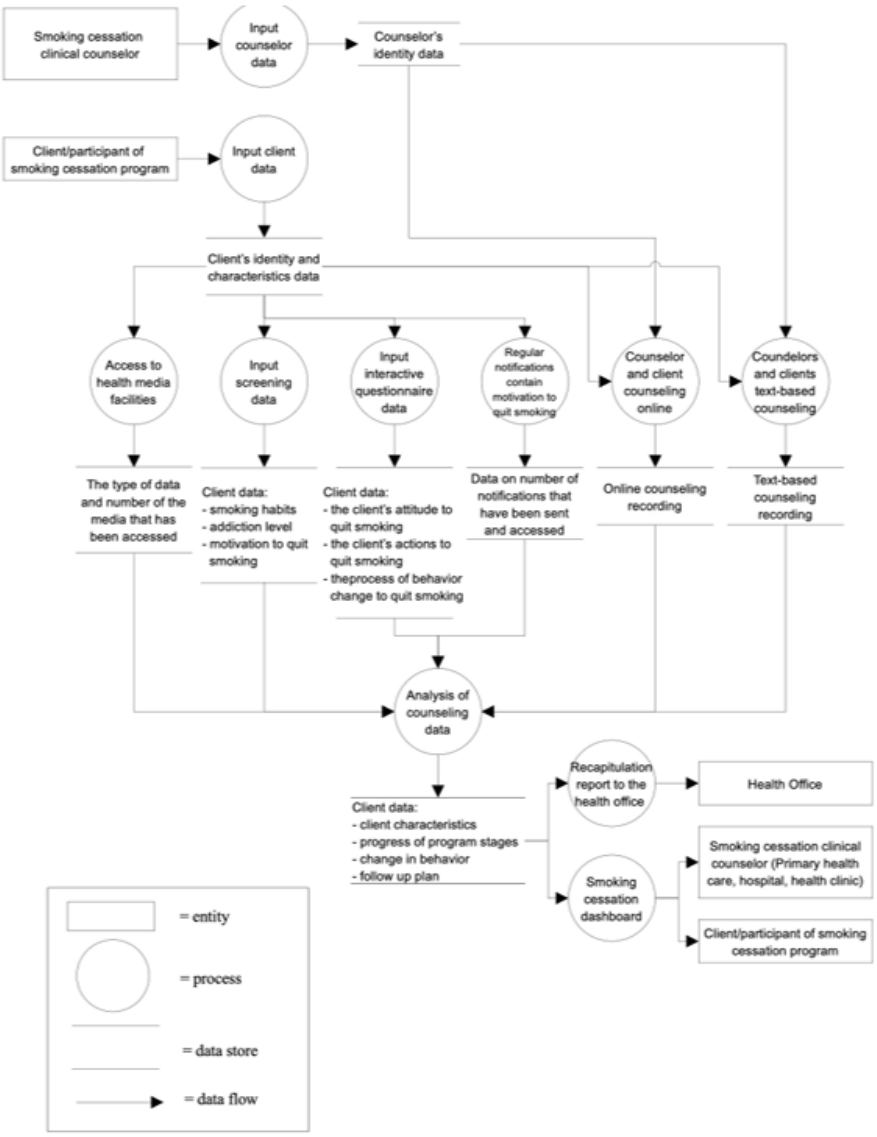

Figure 2. Data Flow Diagram of the Mobile Application Concept for Smoking Cessation

The mobile application concept model that contains various system components such as entities and application features is described in the Data Flow Diagram. The Data Flow Diagram for the mobile application concept model of Efforts to Quit Smoking is presented in the Figure 2. Initially, the input data consists of counselor data and client data. The counselor data is the identity of the counselor, while the client data consists of the client's identity and characteristics, namely access to health facilities, screening data, interactive questionnaire data, notifications and routines containing motivation to quit smoking. Counselors and clients conduct online and text-based counseling. All data generated will be analyzed to produce data on client characteristics, progress from the program stages, behavior changes and follow-up plans. The results are recapitulated and reported to the health department and collaborating health facilities, besides that they are also sent to the smoking cessation dashboard.

The results of the FGD showed the great importance of smoking cessation from all the stakeholders. One of the focuses of smoking cessation activities initiated by the Ministry of Health of Republic of Indonesia, as referred to the National Mid-Term Development Plan 2020-2024 indicator, is to reduce the prevalence of smoking at the age of 18 years. These activities, also refers to the Program Action Plan 2020-2024 of Ministry of Health of Republic of Indonesia (Ministry of Health of Republic of Indonesia, 2020)aims to provide smoking cessation services and improve the participation of districts or cities that implement smoking free areas regulation in 7 settings namely healthcare facilities, schools, playground, worship place, public transportation, workplace, public places, and other designated places

Discussion

The availability of data and information on demographic characteristics of the clients, smoking status, addiction level, history of previous smoking cessation effort, smoking behavior, and motivation to quit smoking level play a great importance in giving a comprehensive understanding about the clients and their smoking habits. A comprehensive understanding about the clients and their smoking habits are necessary in order to address the most suitable strategy for each individual. As suggested by Valery, it is important to identify both intra- and inter-personal factors that are associated with adolescent smoking cessation for cessation interventions (Dalum et al., 2012; Lemmens et al., 2008). Understanding the personality of the smokers would be helpful to identify health-enhancing or factors that related to quitting attempt, also health-destructive or factors that were responsible for relapse behaviors as sources of information in framing interventions that particularly target these personality traits and behaviors (Kulkarni et al., 2018).

Regarding the smoking cessation efforts among adolescents, the Ministry of Health of Republic of Indonesia compiled a curriculum and training module of training of trainers for health officers and teachers in the implementation of smoking-free areas regulation in schools, to produce competent and professional facilitators in training health workers in smoking cessation counseling training. After attending the training, health workers are aware that they are expected to communicating, providing information and education on the impact of cigarette consumption on health, contributing in the efforts of quit smoking, measuring risk factors for non-communicable diseases due to smoking, conducting smoking cessation effort counseling in primary health care facilities, doing follow-up efforts to quit smoking, doing recording and reporting, and conducting training on trainers in the implementation of smoking-free areas regulation in schools.

In addition, teachers and other educators are expected to explain the effect of cigarette consumption on the health, behavior of school children and the teaching and learning process, making efforts to stop smoking in the school environment, increasing the role of peer groups and students as agents of change, conducting counseling on efforts to stop smoking in schools and increase the motivation of students to quit smoking, implementing a smoking cessation service referral system, explaining the effects of tobacco industries interventions on schools, and conducting training on trainers for implementing smoking-free areas regulation in schools. Teachers have important rule in influencing the students, it was believed that teacher was a person who conveys knowledge, experience and life skills in various fields for students both inside and outside the school. A teacher should be a good adviser and listener to students' problems especially in order to create awareness and improve the effectiveness of smoking prevention (Chirasatienpon et al., 2021).

The components of participants trained in each province or region consist of one person in charge for the cessation efforts program from each selected health centers, one teacher from an elementary level or equivalent, one teacher comes from the junior high level or equivalent and one teacher from the senior high level or equivalent.

Selection of the participants must be under the guidance of the selected health centers area. Not only training for health workers at health centers and teachers, the Indonesian Ministry of Health has also created a network of smoking cessation efforts with a short telephone counseling method that can be accessed throughout Indonesia. The consultation includes initial screening and gathering of callers demographic information and smoking history (Ministry of Health of the Republic of Indonesia, 2011).

Counseling comes from the word counsel, which means providing suggestions, conducting discussions and exchanging opinions. Counseling is an activity to meet and discuss someone who have needs (client) and someone who provides (counselor) support and encouragement in such a way that the client has confidence in the ability to solve problems. The importance of counseling to help clients in smoking cessation programs is caused by several things, including many smokers have difficulty in quitting because of nicotine dependence, quitting smoking causes withdrawal symptoms, which are potential to make the client relapse while trying to quit smoking, and because withdrawal symptoms last 2-4 weeks, the presence of the counselor are highly expected in order to help the clients in the first month of the smoking cessation program (Ministry of Health of the Republic of Indonesia, 2011).

In conducting smoking cessation counseling for clients who are ready to quit smoking, a brief intervention is carried out using the 5A approach, namely identification of the client's smoking status and situation (Ask), assessment the value of the client's readiness to quit smoking (Assess), give advice with a clear and firm message according to the client's situation (Advice), help clients to quit smoking by identifying smoking cessation readiness (Assist) which defined into 3 categories, namely by providing brief motivation with the 5R approach to those who are not ready to quit, designing the smoking cessation program design for those who are ready to quit, and preventing relapse to those who are on the process of stopping, and conduct a follow-up strategy including arranging the schedule for the next counseling (Arrange). The approach has been in accordance to the toolkit which was developed from behavioral change method by WHO (World Health Organization, 2014).

Evidence found stated that 5A comprehensive intervention was effective in improving migrant workers' knowledge of smoking and anti-smoking attitudes. The method was operational and feasible for team leaders to conduct appropriate interventions. The intervention messages to enable the achievement of significant improvement in knowledge and attitude (Grech et al., 2020).

Clients who are not ready to quit smoking would be given a brief motivation with the 5R approach, namely providing information which associating smoking with negative impacts on health, benefits, economy, and the lives of those around the client (Relevance), ask clients to describe themselves the dangers that arise from smoking, both acute and long-term risks to the environment around the client (Risk), invite clients to identify the benefits that can be obtained from quitting smoking (Reward), ask and explain to clients about possible obstacles that can arise from trying to quit smoking (Roadblocks), give continuous support to the clients (Repetition) (World Health Organization, 2014).

Counseling is usually carried out by a health workers or experts. The evidence found that healthcare professionals are recommended in providing smoking cessation interventions but sometimes the lack of sufficient time, organizational barrier, may require healthcare management exploration and action to adjust with the program (Grech et al., 2020). Thus, counseling methods that are diverse and have choices will make it easier for smokers to find the most effective option and also for the counselors themselves. The increased use of the internet by young adults may lead to high utilization of online counseling by this age group (Zeren et al., 2020). With the emergence of the COVID-19 pandemic that started, not only young adult, but also mostly people inevitably get used to using technology and the internet in their activities. Moreover, during the COVID-19 pandemic that has occurred in recent years, holding virtual meetings that do not involve physical interaction may reduce the risk of direct contact between counselors and clients, this would reduce the risk of transmitting the COVID-19 virus. Digital solutions can be effective in reducing the threat of pandemic. Therefore, mobile health (m-health) can be one of the solution that offers an accessible and cost-effective answer to improving public health especially in pandemic condition (Asadzadeh & Kalankesh, 2021).

Online counseling may become alternative option, beside face-to-face counseling that already provides in healthcare facilities. Online counseling can be similar to face-to-face counseling in creating a good therapeutic alliance between psychologist and clients based on empathy and listening (Zeren et al., 2020). Online counseling has the potential to help clients in remote areas

who have access problems to the facilities. Online counseling also helps clients who want a safe environment to express emotionally related issues to counselors and it results in clients' secure feeling and comfort to share with counselors about personal issues involving emotions without having to face each other (Mejah et al., 2020).

Turkish smoking cessation clinics train a group of doctors by adapting evidence-based cessation training materials to the Turkish cultural context through a formative research process. The programs carried out are Training of Trainers (TOT) in special skills in disease management and the smoking cessation method for nurses and psychologists. Smoking cessation in Turkey also produces videos related to smoking-related diseases and smoking cessation skills to be used in smoking cessation training and guides for lay people to use in smoking cessation counseling at smoking cessation clinics in the country (Quit Tobacco International, 2020b). Meanwhile, in India, they use a module conducted by doctors that will advise smoking patients with suggestions to quit smoking according to their disease and as a way to determine relevance. The method used in smoking cessation in India is similar to 5A (Ask, Assess, Advise, Assist and Arrange) and each of the stages has clear boundaries (Quit Tobacco International, 2020a).

A study by Qian in 2021 showed that the online smoking cessation community brings people who quit smoking together, and users are seem to provide rich types of social support for each other. Users can also effectively obtain targeted social support in different posting scenarios and smoking cessation stages. This study suggested that smoking cessation projects should be designed to promote user communication and interaction, which positively affects achieving users' smoking cessation goals (Qian et al., 2021). A randomized clinical trial of 188 smokers in the South Central US also showed that 9.5% who received electronic outreach messaging and interacted with their physician via a smoking cessation survey initiated a quit attempt (Erdmann et al., 2022).

Health information tehnology is important to increase smoking cessation. Studies found that there are association between health information technology-based interventions and increase of smoking cessation in the general population (Guo et al., 2023). Technological developments have opened the boundaries of online communication widely, and this has also provided space for the improvement counseling services delivery to the public (Mejah et al., 2020). Likewise, in developing efforts to stop smoking, especially in Indonesia, technology innovation and ease of access is needed for program targets, in this case are smokers who want to quit smoking. By using and combining various methods including the smoking cessation strategy that already exists, and provide it to be mobile service that is accessible from anywhere and anytime, this would facilitate people to access smoking cessation by online counseling which offered to smokers who have intention or curiosity about quit smoking. This is expected to have a good impact on the development of smoking cessation efforts in the future.

CONCLUSION

Based on the results of the study, it can be concluded that the availability of data and information on demographic characteristics of the clients, smoking status, addiction level, history of previous smoking cessation effort, smoking behavior, and motivation to quit smoking level play a great importance in developing smoking cessation intervention through mobile application. The implementation of 5A (Ask, Assess, Advise, Assist and Arrange) methods for the clients who are ready to quit smoking and 5R (Relevance, Risk, Reward, Roadblocks, Repetition) to those who are not potential to give cessation intervention and continuous support for the mobile application users.

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