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## RESEARCH ARTICLE

### An Integrated Smoking Cessation Intervention in the Primary Care Service System: An Intervention Mapping

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#### Abstract:

#### Background:

Smoking cessation is beneficial for smokers of all ages. Moreover, smokers who quit tobacco use benefit from COVID-19 risk avoidance.

#### Objective:

This project aims to develop a smoking cessation intervention protocol in the primary care service system.

#### Methods:

Intervention Mapping guidelines for health promotion planning program was used as an instruction includes 1) need assessment, 2) aim determination, 3) selecting theory-based approaches selection and practical strategies and intervention design, 4) intervention development, 5) planning the implementation of the program and 6) planning the evaluation.

#### Results:

According to the needs, smoking cessation behavior was indicated as an outcome of the intervention. The socio-ecological model (Fig. 1) and the transtheoretical model were performed as the theoretical underpinning of the intervention. Moreover, the proactive multisession telephone counseling integrated with the smoking cessation service in the primary care service was used as an intervention for smokers. The average quit attempts after the quit date were 2.13 times (SD = 1.33), with an abstinence rate of 88.24 percent, according to early findings among the experimental group 30 days after the quit date.

#### Conclusion:

An intervention mapping can be used as a guideline to develop smoking cessation in the primary care setting. This study provides the smoking cessation protocol delivered for Thai smokers, particularly in the primary care service system, to promote sustainable well-being among Thais.

**Keyword:** Smoking cessation, Primary care, Intervention mapping, Smoking status, Telephone counseling, Smokers.

#### Article History

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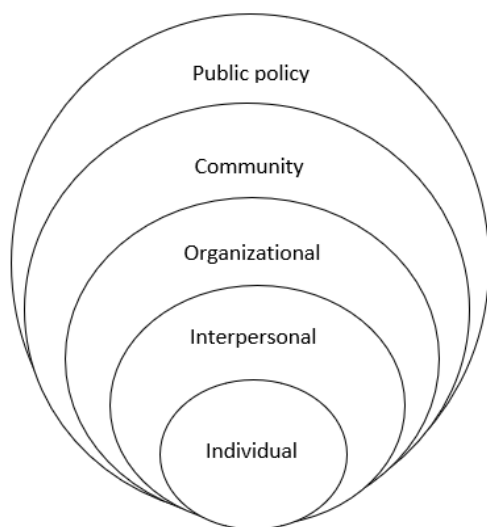
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## 1. INTRODUCTION

Tobacco use is currently one of the most serious global health issues, with Thailand being no exception [1]. Moreover, smokers who decide to quit tobacco use benefit from COVID-19 risk avoidance and decrease the mortality rate from complications related to COVID-19 [2]. A smoking cessation service system in Thailand has been implemented by recom-

mendations of the World Health Organization Framework Convention on Tobacco Control (WHO FCTC) Article 14 [3]. Even though there are many efforts to provide smoking cessation services, the quantity of smokers who can quit smoking successfully has been lower than the standard indicator of Thailand. However, Thailand's earlier smoking cessation program for smokers was compartmentalization, which was given by healthcare providers. It is indicated that there are a lot of weak points and challenges in the existing smoking cessation system. These issues and challenges must be adequately addressed to achieve Thailand's national indicator for tobacco control [4].

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**Fig. (1).** The socio-ecological model [7].

To offer smoking cessation in the primary care setting, nurses play crucial roles in identifying smokers, finding out the most suitable strategies for each smoker, and monitoring the expected outcomes of provided care [5, 6]. Moreover, they usually appraise and comprehend the context facilitating smoking cessation accurately. Significantly, they have worked as coordinators among the related organizations. However, the most appropriate theory underpinning smoking cessation implementation in primary care has been inconclusive. Hence, this paper proposes a strategy for applying the socio-ecological model (SEM) proposed by McLeroy Bibeau [7] in accordance with the intervention development guidelines [8] to reach the strategic plan for tobacco control indicators of Thailand National. The SEM viewpoint focuses on the association between the environment encompassing person and health problem by dividing into five levels. Therefore, the SEM has been performed for explaining the interaction between hazard behavior and the crucial environments, particularly smoking behavior. Furthermore, the transtheoretical model (TTM) [9] was used as the theoretical support for the outcome identification-smoking status.

## 2. MATERIALS AND METHODS

We used the SEM [7] and the TTM [9] as theoretical support for outcome identification-smoking status, as well as the Intervention Mapping [8, 10] guidelines to develop a smoking cessation intervention program in the primary care system. As shown in the illustration, the model consists of six steps.

### 2.1. Step 1: Assessing the Needs

A systematic review and meta-analysis study was performed to investigate the effectiveness of the existing smoking cessation services in the Thai primary health care setting. Mixed automated and manual search strategies were employed. The databases from January 1993 to June 2018 were

used: CINAHL, PubMed, ScienceDirect, SpringerLink, and PUBMED. A combination of the constructs “smoking cessation”, “tobacco control”, “tobacco cessation”, “intervention”, “counseling”, “motivational interviewing”, “quit”, “stop”, “abstinence” and related keywords were searched in order to certify comprehensive coverage of published papers.

We determined the eligible studies to catch both meaningful and methodological attributes. The coding emphasized the research design, purpose of the study, factor associated with the attributes of study participants, nature of the ordinary implementation and comparison, follow-up, intensity, and outcome assessment. The risk of bias was assessed by The Cochrane Collaboration tool [11] to investigate the quality of the selected papers. Then, we conducted meta-analyses using Review Manager (RevMan5.3, The Cochrane Collaboration, Oxford, England) [11].

The findings revealed that the effectiveness of the existing smoking cessation services in the Thai primary health care setting was limited. Previous studies have shown that only 10% of smokers were able to quit smoking after six months overall [12]. In other words, the effectiveness of existing smoking cessation services was assessed for each setting using a six-month quit rate as an indicator: 1) 18% for smoking cessation clinics in the hospitals [13], 2) 1% for Quit for King project [12], 3) 24.5% for The SMART Quit Clinic (Pharsai Clinic) in Ubon Ratchathani University [14] and 4) 37% for Thailand National Quitline (TNQ) [15]. Therefore, it is believed that primary healthcare providers' tobacco cessation services should be better promoted, remarkably increasing usage of existing smoking cessation services.

Approximately three-fourths of Thai smokers have not used tobacco cessation services [1], particularly in the primary healthcare setting. Additionally, the TNQ [15] reported that less than 10% of Thai smokers received smoking cessation services by the TNQ. Furthermore, approximately two-fifths of clients living in Bangkok and the central region of Thailand and most smokers were referred by the secondary and tertiary hospitals. Also, only 0.29% of customers were recognized by the TNQ's services information from sources of primary healthcare. The findings reflected that most smokers living in rural areas had not accessed the smoking cessation service provided by the TNQ. Because there are numerous hurdles to smoking cessation services for smokers in the community. As a result, barriers to smoking cessation service use in primary care-the smoking cessation service system was not blatant-should be found to raise the number of smokers using the existing services, notably the referral system to the TNQ. The meta-analyses demonstrated that smoking cessation advising utilizing multisession proactive stage-matched telephone counseling directing was the best procedure for smoking cessation on 7-day Point Prevalence of Abstinence (PPA) when contrasted and no treatment or regular consideration. Alternately, different intercessions brought about nonsignificant contrasts between the trial and control gatherings. In synopsis, phone counseling was the most appropriate methodology for working with smoking suspension in grown-up smokers in the primary care setting. More research

is needed to determine the optimal intervention length, force, and frequency for assisting smokers in quitting in primary care [16].

**2.2. Step 2: Determining the Aims of the Intervention**

In the second procedure, quit rate outcomes were determined in the prior procedure as well as the practical goals were drawn to realize these outcomes. Then, we compared each of the practical goals between the most crucial and variable elements extracted in the former procedure, and a matrix of change goals was created by intersecting practical goals with the determinants. Finally, quasi-experimental research was selected as a research design in this study. The goal of the intervention is to see how an integrated smoking cessation service model affects smoking status in community smokers by comparing the experimental and control groups' 7-day PPA scores at six months.

**2.3. Step 3: Selecting Theory-based Approaches and Practical Strategies and Intervention Design**

The SEM is a social and environmental theory [7]. It involves systems of individual and environmental relationships, complex relationships between individuals living in the system, and interdependent relationships between members or system components. If any part of the system changes, it affects other parts of the system as well. Applying this idea to health promotion classifies the environmental factors influencing health behavior into five levels: intrapersonal, interpersonal, organizational, community, and public policy.

From past projects, it was found that the SEM was used to describe health behaviors and to implement health problem-solving work with different models. With links between biological factors, behavior, and sociology, the importance of using the SEM for promoting the appropriate health behavior focuses on modifying individual factors and social environments by implementing five levels of modifications that require a wide variety of strategies and operations. It is an inclusive and complete health promotion model that can be used both to describe behavior and guide management and practice.

The SEM and the theory of behavior change procedures were applied to develop an integrated smoking cessation model for the primary health care system. There are different levels of development:

**2.3.1. THE Policy Levels at the Community Level and the Organization Level**

Consisted of 1) development of the potential capacity of the Community Health Workers (CHWs) in helping to quit smoking, including 1) offering brief advice to promote the smokers quit through home visits, 2) referring the smokers' information for receiving the intensive staged-based [17] proactive telephone counseling for smoking cessation by the TNQ, and 3) providing follow-up for preventing relapse. The CHWs, a very crucial health care volunteer in Thailand, have a responsibility to take care of people in the village. Moreover,

nurses working in the Health Promoting Hospitals (HPHs)- the hospital in the primary care setting in Thailand were trained for supervising the CHWs following the study protocol by the researcher (Fig. 2).

**2.3.2. Individual and Interpersonal Levels**

Consisted of 1) delivering brief advice to promote the smokers quit through home visits, 2) referring the smokers' information for receiving the intensive staged-based [17] proactive telephone counseling for smoking cessation by the TNQ counselors *via* the mobile application, and 3) providing follow-up for preventing relapse. An overview of the application of the SEM is shown in Table 1.

The TTM [9] has been practicing behavioral change, especially smoking cessation. This model helps the researchers understand how to provide the specific intervention in each stage. People could use different techniques to change their behaviors in each stage depending on the surrounding context. Generally, the TTM has been used to explain changing behaviors, serving the specific technique to change unexpected behaviors [17]. Ten processes of change can be divided into two higher factors labeled cognitive/experiential and behavioral. Also, self-efficacy and decisional balance (*i.e.*, pros and cons) are crucial components of the TTM [18], and these elements appear to help clarify why health behavior changes occur. Moreover, decisional balance is associated with the perceived "pros" (merits) and "cons" (demerits) between ongoing current behaviors and changing behaviors. Decisional balance demonstrates weighing the advantage and disadvantages of changing through vigorous behaviors and is essential for beginning phase movement [9].

**Table 1. Application of an ecological model framework to develop an integrated smoking cessation model in a primary health care system.**

S.No	Level	Intervention
1	Community, organization, and policy	1. Developing the potential capacity of the CHWs to help quit smoking through brief smoking cessation advice, referring the smokers' information for receiving intensive counseling for smoking cessation by the TNQ, and home visits to prevent relapse. 2. Developing the potential capacity of nurses working in the HPHs in supervising the CHWs following the study protocol. 3. Providing intensive counseling for smoking cessation by the TNQ counselors
2	Individual and interpersonal	1. The CHWs provide brief advice to quit smoking to raise motivation to quit smoking 2. The TNQ counselors provide intensive counseling for smoking cessation by phone, and the CHWs visit home to prevent relapse.

Finally, the TTM [9] was used as the theoretical support for the outcome identification-smoking status. The study participants were asked about their quit attempts 7, 30, 90, and 180 days after the quit date. Additionally, 7-day PPA at 180 days after the quit date was used to identify smoking status using self-report. On the one hand, smokers participating in the program can stop smoking for seven consecutive days at 30, 90, and 180 days after quitting tobacco use.

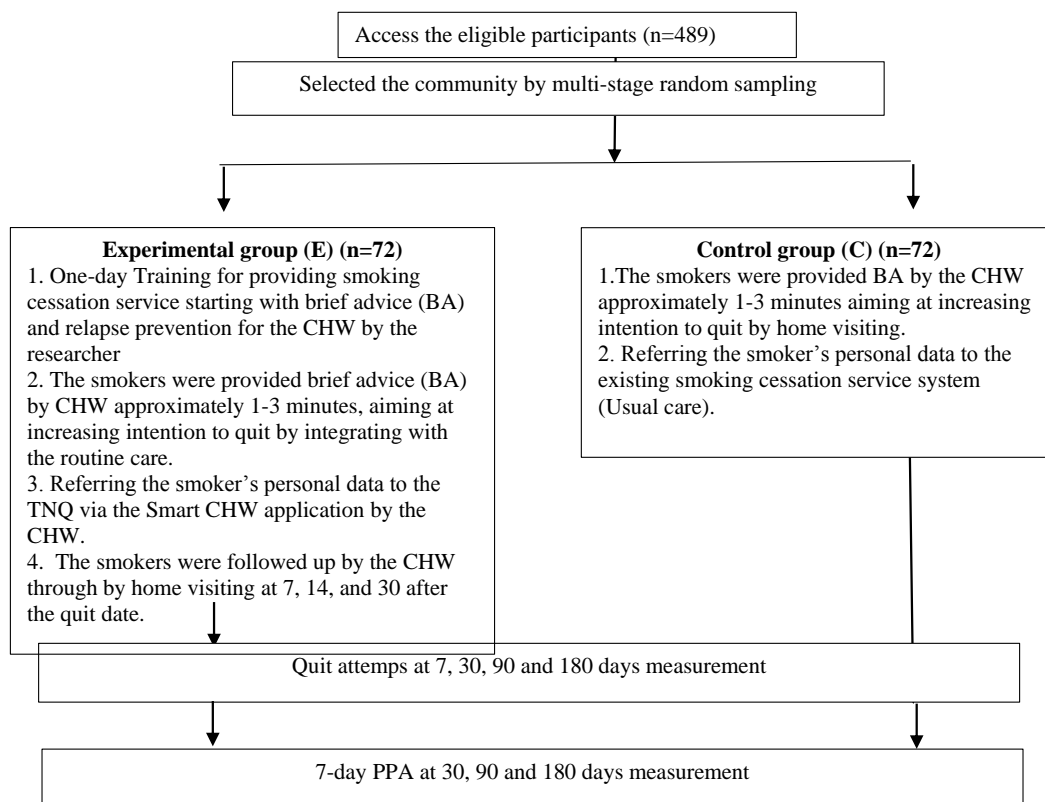


Fig. (2). The study protocol.

#### 2.4. Step 4: Intervention Development

We designed the smoking cessation program's significant components in accordance with the literature review and set a meeting with stakeholders, including two sessions:

##### 2.4.1. Smoking Cessation Service Design and Development Training Capacity

Smoking cessation services were designed by the researchers and related organizations, and the CHWs helped researchers build their smoking cessation capability. Furthermore, nurses working in the HPHs were preparing to supervise CHWs who were following the study protocol.

##### 2.4.2. Integrated Smoking Cessation Service Delivery

In this step, the researchers and nurses working in the HPHs work as supervisors to facilitate the CHWs, whereas the CHWs worked as research assistants. Firstly, the CHWs provided brief advice for smokers through home visiting. After the participant was willing to join the project, the CHWs collected the data. Then, the smokers' data was sent to the TNQ to receive proactive multisession intensive telephone counseling using Stage-match intervention by the TNQ counselors. Next, the CHWs offered follow-up for preventing relapse at 7, 14, 30, 90, and 180 days after the quit date. The smokers have measured quit attempts at 7, 30, 90, and 180 days after the quit date. Finally, the 7-day PPA was evaluated at 30, 90, and 180 days after the quit date for the study participants. After completing the training program, the CHWs and research assistants were tested on their knowledge of smoking cessation

services and smoking cessation support behavior and to ensure the intervention's validity. Then, the study protocol, study manual, research instruments, smoking cessation assisting video, recording tobacco use, giving brief advice, and equipment were developed. After that, five experts asked the research instruments to approve for content validity. Furthermore, all instruments were revised following the experts' recommendations. Then the research project was asked for approval by the Ethics Sub-Committee for Research Involving Human Subjects, Nakhon Pathom Rajabhat University (ECNP) (COA No. 016/2021). Before conducting the study intervention, the study protocol, information, and informed consent form were considered ethical to assure confidentiality and anonymity.

#### 2.5. Step 5: Planning the Intervention of the Program

After the ECNP approved the study proposal, the researchers contacted the related organizations in the selected areas for reviewing participant's data and data collection. Then, the researchers contacted the nurses working in the selected HPHs to screen the participants who met the name lists' criteria. The community smokers and the CHWs who meet the inclusion criteria from the name lists reported by the Health-promoting hospital were assigned to the study participants.

The participants were smokers from four communities, selected from one province in the central region of Thailand, Nakhon Pathom Province. It was because the smoking prevalence in this province [19] had still been higher than the indicator of Thailand National Strategic Plan for Tobacco

control. Moreover, this province could represent all provinces since it was combined with urban and rural areas. Nakhon Pathom comprised seven districts. The Mueng Nakhon Pathom district was specifically selected for consideration in this study. Moreover, this area is a good representative of the current smoking situation. It consists of eighteen HPHs. The HPHs were selected by a simple random sampling technique. Finally, two HPHs were randomly chosen to represent HPHs. Then, the selected HPHs were randomly assigned into experimental and control groups, with two communities in each group. To avoid the threats of validity, the experiment and control group participants were divided into two groups using a matched-pairs design at the beginning.

The research instruments consist of two parts:

Firstly, the intervention instrument, which is a Smoking cessation program, includes 1) study protocol, 2) Smoking cessations handbook for the Community nurses and the CHWs are composed of: 2.1) knowledge associated with smoking cessation service includes Tobacco hazard and impact on individual health, second hand, third-hand smoker, smoking cessation process, smoking cessation treatment, helping smokers base on staged match intervention starting by brief intervention and relapse prevention and 2.2) smoking cessation service skill.

Secondly, instruments for data collection are demonstrated as follows:

Demographic data of participants includes 1) Demographic data of smokers consists of gender, age, educational level, occupation, underlying disease, type of tobacco, and smoking duration, 2) Demographic data of the CHW consists of gender, age, academic level, occupation, the CHW experience, acquiring knowledge regarding cigarettes, and smoking cessation assistance experience.

The heavy smoking index (HSI) [20] includes two questions to examine the level of nicotine dependence. The nicotine addiction level was interpreted by the score as follows: low addiction (0-2), moderate addiction (3-4), and high addiction (5-6).

The staging questionnaire [21] consists of five questions based on the stage of change model, with the goal of determining the smokers' stage of change in the community: "Are you seriously thinking of quitting smoking?" The stage of change was interpreted by the score as follows: 1) No, not at all thinking about quitting (pre-contemplation), 2) Yes, within the next six months (contemplation), 3) Yes, within the next 30 days (preparation), 4) Yes, I quit within the last six months (action), and 5) No, I quit more than six months ago (maintenance).

Quit attempt measurement [22] includes a question that includes a question: "How many times have you stopped smoking for 24 hours or longer?"

Lastly, the Validity check instrument, two instruments for appraising the CHWs' capacities for offering smoking cessation service, was tested as a validity check as follows:

Knowledge Associated with Smoking Cessation (KASC) includes a set of questions developed by the researcher. It was

contained with five dimensions including 1) Tobacco hazard and impact on individual health, second hand, third-hand smoker 2) benefits of smoking cessation, 3) brief advice for smoking cessation process, 4) nicotine withdrawal and solutions, and 5) referring system to the smoking cessation service and arrange to follow up methods. It consisted of 25 items with a dichotomous answer for choosing: "correct or incorrect" (correct = 1 point, incorrect = 0 point). The KASC in the Thai version obtained good content validity; the reliability using Cronbach's alpha was 0.80 [23]. The content validity index was 0.83-1.00 for item-content validity index (I-CVI), 0.92 for Scale-level CVI/universal agreement (S-CVI/UA), and 0.98 for Scale-level CVI/average proportion (S-CVI/Ave) [23].

Smoking cessation assistance behavior (SCAB) includes a set of questions developed by the researcher. This instrument was used for reporting smoking cessation assistance behaviors among the CHWs by themselves. The procedures for smoking cessation assistance behavior include six steps as follows: 1) building relationships and assessing motivation to quit smoking, 2) convincing smokers to quit by providing brief advice for smoking cessation, 3) referring to TNQ, and 4) offering follow up to prevent relapse among smokers after quitting smoking. The 27 Likert scale items with five categories (Always, Usually, Sometimes, Rarely, and Never) were used; higher scores indicated more frequent smoking cessation services. It was rated on the frequency of determining smoking cessation assistance behavior as a 5-point scale from 0 (Never) to 4 (Always). The SCAB in the Thai version obtained good content validity; the reliability using Cronbach's alpha was 0.88 [23]. The content validity index was 0.83-1.00 for item-content validity index (I-CVI), 0.93 for Scale-level CVI/universal agreement (S-CVI/UA), and 0.99 for Scale-level CVI/average proportion (S-CVI/Ave) [23].

## 2.6. Step 6: Planning the Evaluation

Smoking cessation assistance capability and knowledge associated with smoking cessation among the CHWs have been validated in this program by questionnaires developed by the researchers. Five experts confirmed content validity. Then, the reliability was tested by data collecting in 30 CHWs working in another sub-district.

This project was a quasi-experimental design that organized the subjects; smokers were randomly allocated into two groups-experimental and control groups. The sample size of smokers was calculated using G\*Power Program version 3.1.9.4, with 72 participants in each group.

## 3. RESULTS

In order to achieve the goal of smoking cessation intervention, the study protocol was drawn after revising following the suggestion of experts. Nurses who work in the primary care system need to follow the study procedures, which are as follows:

Firstly, CHWs were trained in smoking cessation, and nurses working in HPHs were trained to supervise CHWs who followed the researchers' study protocol.

Secondly, smokers were given a brief intervention by

CHWs who came to their homes to build their intention to quit, motivation to quit, and quit attempts, as well as persuade them to participate in the tobacco cessation service system. Then, the participant's data were sent to the TNQ *via* the mobile application by the CHWs in order to receive proactive multisession intensive telephone counseling using stage-matched intervention by the TNQ counselors.

Thirdly, the study participants were delivered follow-up by the CHWs at 7, 14, 30, 90, and 180 days after the quit date in order to prevent relapse.

Finally, the study participants were measured the 7-day PPA at 30, 90, and 180 days after the quit date, as well as reported quit attempts at 7, 30, 90, and 180 days following the quit date.

The control group received usual care, which was defined as smoking cessation services delivered by CHWs trained under the Quit for King program, as reported by the HPHs.

Then, they delivered brief advice for the smokers for approximately 1-3 minutes, aiming to increase intention to quit by home visiting, and/or the smokers were referred to the existing smoking cessation service system of the HPHs, such as using the traditional Thai therapy, 0.5% Sodium nitrate mouth wash.

This paper presents the preliminary findings among the participants in the experimental group 30 days after the quit date. The result showed that the average quit attempts after the quit date was 2.13 times (SD = 1.33). Moreover, the abstinence rate of study participants was 88.24%.

### 3.1. Data Analysis

Propensity Score Matching (PSM) was used to analyze the probability of the outcomes between the experimental and control groups after balancing the covariates from the literature review [24], including age [25], the total number of years for education [26], underlying disease [27], smoking duration [28], and nicotine addiction level (HSI score) [29].

## 4. DISCUSSION

Smoking cessation intervention using an intervention mapping provided in the primary care setting is increasingly responding to the complexities of health determinants. The SEM offers the framework to describe human behavior's difficulties on multiple levels of intervention to promote health. Furthermore, the SEM and the TTM help the healthcare provider, particularly nurses, understand real-world complexities, offer smoking cessation services, and co-operate with the related organizations suitably. This study indicated that an integrated smoking cessation intervention in the primary care system raised smokers' motivation to stop and improved their chances of quitting successfully. This finding was consistent with previous studies [30, 31]. Smokers who were offered the smoking cessation service by CHWs who understood the background information and were given intensive counselling by TNQ counsellors with special expertise in smoking cessation may have a higher chance of quitting successfully.

With all reasons taken into account, professional nurses working in tobacco control and researchers must collaborate to advance the field by expanding their understanding of the SEM. The Integrated smoking cessation service model increased the quit rate among Thai smokers. Consequently, the stage-matched intervention is beneficial for Thailand.

## CONCLUSION

An intervention mapping can be used as a guideline to develop smoking cessation in the primary care setting. Nurses should play a significant role in supervising CHWs in primary care smoking cessation services in order to urge community smokers to quit smoking completely. This study provides the smoking cessation protocol delivered for Thai smokers, particularly in the primary care service system, to promote sustainable well-being among Thais.

## LIMITATIONS

The CHWs might face some obstacles while visiting the smokers' homes due to the COVID-19 pandemic.

## LIST OF ABBREVIATIONS

**WHOFCTC** = World Health Organization Framework Convention on Tobacco Control

**KASC** = Knowledge Associated with Smoking Cessation

## ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The Ethics Sub-Committee for Research Involving Human Subjects, Nakhon Pathom Rajabhat University (ECNP) (COA No. 016/2021), approved the research project.

## HUMAN AND ANIMAL RIGHTS

No animals were used for studies that are the basis of this research. All the humans used were in accordance with the Helsinki Declaration of 1975.

## CONSENT FOR PUBLICATION

Before conducting the study intervention, the study protocol, information, and informed consent form were considered ethical to assure confidentiality and anonymity.

## STANDARDS OF REPORTING

STROBE guidelines were followed.

## AVAILABILITY OF DATA AND MATERIALS

The data supporting the finding of this study are available within the article.

## FUNDING

This study was financially supported by a Graduate School Thesis Grant, Chulalongkorn University, Nakhon Pathom Rajabhat University, and Tobacco Control Research and Knowledge Management Center.

## CONFLICT OF INTEREST

The authors declare no conflicts of interest, financial or otherwise.

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