

Evidence of regression towards the mean in tobacco use before, during, and after the COVID-19 quarantine in Thailand–Malaysia border areas: A cross-sectional study

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ABSTRACT

INTRODUCTION Previous studies have reported that the COVID-19 pandemic affected smoking behaviors; however, the effect of quarantine on smoking has been limited. This study aimed to examine changes in smoking from before, during, and after discharge from quarantine, as well as the factors associated with these changes.

METHODS A cross-sectional study using telephone interviews was conducted among 683 adult smokers who had undergone home, local, or state quarantine in southern Thailand in 2021. A structured questionnaire was used to assess demographics, smoking behavior, and knowledge of diseases due to COVID-19 and cigarette smoking.

RESULTS Current smoking was most prevalent in the local quarantine group (66.4%), while most quarantine individuals in the home (71.1%) and state groups (73.4%) desired to quit smoking as soon as possible. During quarantine, average daily cigarette consumption significantly decreased in the local and state groups (from 10 to fewer than 4–5 cigarettes/day). In contrast, it remained relatively similar in the home group (from 10.5 to 10.3 cigarettes/day). Cigarette consumption at post-quarantine resumed towards the average smoking before the quarantine. The adjusted linear regression model revealed that awareness of the full control measures, compared with awareness of no control measures, reduced cigarette consumption by 3.68 cigarettes/day (95% CI: -5.49 – -1.86). In contrast, smokers who had severe nicotine addiction increased cigarette consumption by 4.13 cigarettes/day (95% CI: 0.78–7.47) compared to those with mild nicotine addiction. Education level and knowledge of smoking or COVID-19-related diseases were not significantly associated with the change in smoking behaviors.

CONCLUSIONS More than half of the quarantine participants want to quit smoking as soon as possible. Moreover, they can reduce their smoking during quarantine. Subsequently, their normal smoking habit tends to resume after being discharged from quarantine.

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INTRODUCTION

Smoking remains the leading preventable cause of non-communicable diseases and deaths globally, with approximately 85% of lung cancer cases linked to tobacco smoke^{1,2}. The COVID-19 pandemic led smokers to reassess their

tobacco consumption. Some smokers took the opportunity to reduce or quit due to fear of contracting COVID-19, health concerns, the cost of the product, quarantine, and social distancing^{3,4}. Knowledge about the health risks associated with tobacco use and COVID-19 further motivated smokers to quit⁵. However, others increased their consumption or even relapsed, partly due to anxiety and stress^{3,6-8}.

Smokers faced a sevenfold greater likelihood of contracting the virus and almost a two-fold increased risk of severe respiratory complications associated with COVID-19 and death than non-smokers^{7,9,10}. This alarming statistic underscored the urgency for effective smoking cessation support, particularly in high-opportunity environments such as quarantine facilities. Thailand had three levels of quarantine facilities, including home, local, and state quarantine, each with specific definitions: 1) Home quarantine, quarantine of individuals exposed to high risk at home for at least 14 days after contact with a confirmed case or travel from high-risk areas; 2) Local quarantine, the quarantine of travelers entering a provincial administrative area using a designated place for preventive surveillance and control of COVID-19 for at least 14 days per government guidelines; and 3) State quarantine, the quarantine of individuals entering the Kingdom using hotel business establishments or designated places for surveillance, prevention, and control of COVID-19 for at least 14 days as prescribed by state officers¹¹. The willingness of individuals in quarantine facilities to engage in cessation programs when tobacco access was restricted, highlights the potential of such measures as effective cessation strategies. Most previous studies examined changes in smoking during the COVID-19 pandemic and lockdown, but there are limited data on smoking during quarantine and afterwards¹²⁻¹⁴. The dynamics of smoking behaviors during quarantine are not only about COVID-19 but also an insight into smoking behavior adaptation during prolonged isolation and heightened health risks. These data are highly relevant to designing resilient, remote public health services, ensuring systems are better prepared to support smoking cessation for the next major public health disruption. This study examined changes in smoking before, during, and after

the quarantine period. Moreover, we investigated the factors associated with changes in the tobacco consumption behavior of quarantined individuals.

METHODS

A cross-sectional, telephone interview-based study was conducted in 2021. The study was conducted in collaboration with four Provincial Health Offices in deep southern Thailand, located along the Thailand–Malaysia border. The majority of residents in this area were Muslim. Many of them worked in other Muslim countries, most commonly in Malaysia, Egypt, and Jordan. The area thus had high volumes of travel within and between countries, placing it at high risk of COVID-19 infection and with a high demand for quarantine services.

Study sample and sample size

Four provincial health offices in deep southern Thailand provided a list of names and telephone numbers of all participants who had been quarantined in the past six months. Researchers called all participants on the list on behalf of the Provincial Health Offices to follow up on their health and inquire about their smoking status. The eligibility criteria included only Thai residents aged ≥ 15 years whose telephone numbers were currently valid and reachable. The required sample size was based on a 50% reduction in smoking during quarantine, with 10% precision and a 20% nonresponse rate. A minimum of 125 smokers per quarantine type, for a total of at least 375, were needed.

Measurement and data collection

After obtaining permission from four Provincial Health Offices and receiving a list of quarantine participants, a researcher called to invite them to join the study, obtained oral consent over the phone, and requested permission to record the conversation. The interviews lasted about 20 minutes.

The questionnaire collected sociodemographic information, including current age, religion (Buddhist, Muslim), education level (no formal education, primary school, secondary school, or higher), and occupation (unemployed, government officer/state employee, farmer, private

business/trade, or other). Questions related to quarantine included the reason for quarantine (returning from high-risk countries or high-risk provinces), their perception of smoking control measures (unknown, no control, full control, partial control). Information on smoking cessation during quarantine included desire to quit smoking (no desire, want to quit as soon as possible, or want to quite in the next 6 months), reasons for quit smoking (illness, maintained good health, family, other), methods of quitting ('cold turkey', other), experience of withdrawal symptoms (irritability, stress, other), reasons for successful quitting (family, social support, other). Questions about smoking services at quarantine facilities included availability of smoking areas and support for smoking cessation (advice, nicotine replacement).

Smoking status was classified into current, former, and never smoking. The number of cigarettes smoked per day before, during, and after quarantine was recorded. Detailed information about their smoking prior to quarantine was age of smoking initiation (years), duration of smoking (years), reasons for starting to smoke (novelty seeking or experimenting, peer influence, stress), reason for smoking (craving, socialized, stressed, other), types of cigarette smoked (packaged, hand-rolled, electronic, or other), sources of cigarettes (purchased or received from others), and smoking location (house, workplace, public). Nicotine dependence level was measured by the Fagerström test for nicotine dependence and classified into (mild, moderate, severe)¹⁵. Knowledge of 5 smoking-related diseases and 5 diseases related to COVID-19 was also assessed. The correct answer to each question was worth 1 point (the full mark was 10 points). The researcher completed the questionnaire during the telephone interview and checked all the answers before finishing the interview. All data were entered into EpiData version 3.1 for further analysis¹⁶.

Data analysis

The data from EpiData were transferred to R version 4.1.3¹⁷. Descriptive statistics were used to summarize the data. Continuous variables are presented as means and standard deviations (SD), while categorical variables are presented as

frequencies and percentages. Comparisons between the three groups were performed using one-way analysis of variance (ANOVA) for continuous variables and the chi-squared test for categorical variables. Factors associated with the number of cigarettes smoked during quarantine, a primary outcome, were examined via a multiple linear regression model adjusted for sociodemographic factors as potential confounders. Other covariates were nicotine dependence and knowledge related to diseases caused by smoking and COVID-19 infection. Adjusted β coefficients with 95% confidence intervals presented the number of cigarettes smoked per day compared to the reference group. Statistical significance was determined at a $p < 0.05$.

Ethics statement

All procedures involving human participants were approved by the Ethical Committee of the Faculty of Medicine, Prince of Songkla University (REC: 63-328-18-1) and were in accordance with the 1964 Helsinki Declaration and its later amendments. Verbal informed consent was obtained from all participants over the phone.

RESULTS

The study received a list of 833 smokers who could be contacted, and 683 of them (81.9% response rate) agreed to participate. Table 1 presents the overall demographic profile of the participants and the profile stratified by quarantine type. The average age (mean age 34.6 years, SD=11.7) fell within the working age group across all quarantine types. Muslims (56%) surpassed Buddhists (44%), especially in local quarantine settings. Half of them (47.7%) were single, and the other half (47.6%) were married. Participants in the home (71.4%) and state quarantine (76%) groups had significantly higher proportions who had completed secondary school or higher education than those in the local quarantine (49.1%) group. While half of the participants in the home quarantine were government officials (25.8%) or businesspersons (23.7%), 29.5% of local quarantine participants were unemployed during the COVID-19 pandemic. Most participants in the state quarantine were businesspeople (36.5%) and other (34.8%). Current smoking was more common in the local quarantine

Table 1. Demographic characteristics of the quarantine participants in southern Thailand in 2021 (N=683)

Characteristics	Types of quarantine facilities				p
	Total n (%)	Home n (%)	Local n (%)	State n (%)	
Total, n	683	99	401	183	
Age (years)					0.035*
Mean±SD	34.6±11.7	34.8±12.4	33.7±11.9	36.4±10.7	
Religion					<0.001*
Buddhist	299 (44.0)	65 (67.0)	80 (20.0)	154 (84.6)	
Muslim	380 (56.0)	32 (33.0)	320 (80.0)	28 (15.4)	
Marital status					0.004*
Single	326 (47.7)	45 (45.5)	185 (46.1)	96 (52.5)	
Married	325 (47.6)	46 (46.5)	204 (50.9)	75 (41.0)	
Widow/divorce	32 (4.7)	8 (8.1)	12 (3.0)	12 (6.6)	
Education level					<0.001*
No formal education	29 (5.6)	0 (0.0)	27 (8.1)	2 (1.6)	
Primary school	187 (36.2)	16 (28.6)	142 (42.8)	29 (22.5)	
Secondary school or higher	281 (58.2)	40 (71.4)	148 (49.1)	80 (76.0)	
Occupation					<0.001*
Unemployed during COVID-19	158 (23.3)	9 (9.3)	118 (29.5)	31 (17.1)	
Government officer/state employee	36 (5.3)	25 (25.8)	7 (1.8)	4 (2.2)	
Farmer	86 (12.7)	11 (11.3)	58 (14.5)	17 (9.4)	
Private business/trade	172 (25.4)	23 (23.7)	83 (20.7)	66 (36.5)	
Other	226 (33.3)	29 (29.9)	134 (33.5)	63 (34.8)	
Smoking status					<0.011*
Current smoker	318 (46.6)	39 (39.4)	211 (52.6)	68 (37.2)	
Former smoker	145 (21.2)	18 (18.2)	73 (18.2)	54 (29.5)	
Never smoker	220 (32.2)	42 (42.4)	117 (29.2)	61 (33.3)	
Reason for quarantine					<0.001*
Returned from high-risk countries	512 (75.7)	4 (4.1)	327 (82.4)	181 (99.5)	
Returned from high-risk provinces	164 (24.3)	93 (95.9)	70 (17.6)	1 (0.5)	
Perceived smoking control measures					<0.001*
Not sure	109 (17.6)	4 (10.3)	82 (20.7)	23 (12.6)	
No control	157 (25.4)	26 (66.7)	90 (22.7)	41 (22.4)	
Full control	215 (34.8)	8 (20.5)	117 (29.5)	90 (49.2)	
Partial control	137 (22.2)	1 (2.6)	107 (27.0)	29 (15.8)	

*Statistically significant at $p < 0.05$; p-values are based on comparisons of quarantine by type: home, local, or state.

(52.6%) than in the home quarantine (39.4%) and the state quarantine (37.2%). Almost all participants in the state (99.5%) and most in local (82.4%) quarantine returned from high-risk countries, whereas participants in home quarantine returned from high-risk provinces (95.9%). Participants in the state (65%) and local (56.5%) quarantine

groups perceived some degree of smoking control, whereas only 23.1% of those in the home quarantine group did so.

Table 2 compares the smoking behavior and knowledge of current smokers ($n=318$) in home, local, and state quarantine. All the participants started smoking in adolescence; however, the

Table 2. Cigarette consumption behavior before quarantine among current smokers in southern Thailand in 2021 (N=318)

Smoking behaviors	Types of quarantine facilities			p
	Home n (%)	Local n (%)	State n (%)	
Total, n	39	211	68	
Age at first smoking (years)				0.089
Mean±SD	16±4.9	17.3±4.7	18.1±4.7	
Duration of smoking (years)				0.238
Mean±SD	17.8±11.4	16.2±10.9	18.7±11.3	
Reasons for starting to smoke				0.029*
Novelty seeking/experimenting	27 (71.1)	131 (65.2)	49 (75.4)	
Peer influence	3 (7.9)	14 (7.0)	10 (15.4)	
Stress	1 (2.6)	10 (5.0)	2 (3.1)	
More than one reason	7 (18.4)	46 (22.9)	4 (6.2)	
Cigarettes smoked per day				0.350
Mean±SD	10.6 (7.6)	9.2 (5.9)	10.5 (10.2)	
Type of cigarettes smoked				<0.001*
Packaged cigarettes	17 (43.6)	92 (44.0)	52 (78.8)	
Hand-rolled cigarettes	14 (35.9)	34 (16.3)	7 (10.6)	
Packaged cigarettes+hand-rolled cigarettes	5 (12.8)	80 (38.3)	3 (4.5)	
Packaged cigarettes+e-cigarettes	1 (2.6)	0 (0.0)	4 (6.1)	
Other	2 (5.1)	3 (1.4)	0 (0.0)	
Sources of cigarettes				0.019*
Purchased	35 (100)	129 (78.7)	33 (82.5)	
Received from others	0 (0.0)	25 (21.3)	7 (17.5)	
Smoking place				0.062
House	7 (17.9)	34 (16.4)	15 (23.8)	
Workplace	2 (5.1)	6 (2.9)	4 (6.3)	
Public	2 (5.1)	1 (0.5)	2 (3.2)	
More than one place	28 (71.8)	166 (80.2)	42 (66.7)	
Desire to quit smoking				<0.001*
Do not want to quit	11 (28.9)	90 (44.8)	15 (23.4)	
Want to quit smoking as soon as possible	27 (71.1)	95 (47.3)	47 (73.4)	
Want to quit in the next 6 months	0 (0.0)	16 (8.0)	2 (3.1)	
Reasons for attempting to quit smoking				0.500
Illness	2 (10.0)	8 (9.6)	6 (15.0)	
Stay healthy	4 (20.0)	16 (19.3)	11 (27.5)	
Family's request to quit	6 (30.0)	18 (21.7)	9 (22.5)	
More than one reason	1 (5.0)	16 (19.3)	2 (5.0)	
Other	7 (35.0)	25 (30.1)	12 (30.0)	
Ways to quit smoking				0.018*
'Cold turkey'	14 (63.6)	68 (81.9)	38 (95)	
Using more than one method	1 (4.5)	5 (6.0)	0 (0.0)	

Continued

Table 2. Continued

Smoking behaviors	Types of quarantine facilities			p
	Home n (%)	Local n (%)	State n (%)	
Other	7 (31.8)	10 (12.0)	2 (5.0)	
Reason for smoking				0.011*
Craving to smoke	4 (20.0)	18 (22.8)	1 (2.5)	
Socialize	6 (30.0)	17 (21.5)	18 (45.0)	
Stressed	4 (20.0)	11 (13.9)	7 (17.5)	
More than one reason	5 (25.0)	25 (31.6)	14 (35.0)	
Other	1 (5.0)	8 (10.1)	0 (0.0)	
Disturbing symptoms from quitting smoking				0.591
Irritability	2 (6.7)	11 (8.9)	5 (11.1)	
Stress	1 (3.3)	5 (4.1)	2 (4.4)	
More than one symptom	10 (33.3)	29 (23.6)	6 (13.3)	
Other	17 (56.7)	78 (63.4)	32 (71.1)	
Factors contributing to successful quitting				0.112
Family encouragement	8 (36.4)	29 (36.2)	9 (24.3)	
Social support	1 (4.5)	2 (2.5)	7 (18.9)	
More than one factor	2 (9.1)	9 (11.2)	4 (10.8)	
Other	11 (50.0)	40 (50.0)	17 (45.9)	
Severity of nicotine addiction				0.099
Mild	25 (75.8)	129 (78.2)	50 (87.7)	
Moderate	5 (15.2)	29 (17.6)	3 (5.3)	
Severe	3 (9.1)	7 (4.2)	4 (7.0)	
Knowledge score on smoking-related diseases				<0.001*
Mean±SD	4.7±2.5	3.6±2.4	5.0±2.2	
Knowledge score on COVID-19-related diseases				<0.001*
Mean±SD	3.8±2.5	2.5±2.5	4.3±2.4	

*Statistically significant at $p < 0.05$; p-values are based on comparisons of quarantine by type: home, local, or state.

participants in the home quarantine group started smoking at a younger age (aged 16 years) than did those in the local (17.3 years) and state quarantine (18.1 years) groups. However, there were no statistically significant differences in age of onset or duration among the three groups. Novelty seeking and experimenting with cigarette smoking were the most common reasons for them to start smoking across all groups (65.2% in the local group and 71.1% in the home groups), while the state quarantine participants showed the highest novelty-seeking-driven smoking rates (75.4%). The state quarantine group (78.8%) smoked significantly more factory-made cigarettes than the other two groups (43.6% in the home and 44.0% in the local).

In contrast, the home quarantine smokers (35.9%) preferred hand-rolled cigarettes to those of the other two groups (16.3% in the local and 10.6% in the state). The state quarantine group tended to use more electronic cigarettes (6.1%) than the home group (2.6%), while no one reported electronic cigarette use in the local group. Home quarantine participants purchased cigarettes exclusively themselves, whereas 21.3 and 17.5% of participants in the local and state quarantines, respectively, received cigarettes from others.

Before the COVID-19 pandemic, the participants in the home (71.8%), the local (80.2%), and the state (66.7%) groups generally smoked in multiple places. Smokers in the home (71.1%) and state

(73.4%) quarantine groups were more likely to want to quit smoking immediately than those in the local quarantine group (47.3%) ($p < 0.001$). Nearly half of the smokers reported that the reasons for smoking cessation were staying healthy and a request from a family, as approximately 10% were due to their illness. 'Cold turkey' was the most common method for smoking cessation in the home (63.6%), local (81.1%), and state (95.0%) groups. The common reasons for relapse were craving, socializing, and stress, with socializing reported more frequently in the state quarantine group (45.0%) than in the home (30.0%) and local (21.5%) quarantine groups ($p = 0.011$). Participants suffered from multiple withdrawal symptoms during smoking cessation, 33.3% in the home, 23.6% in the local, and 13.3% in the state, but these differences were not statistically significant across the groups. Family encouragement was an important motivation for successful smoking cessation, with rates of 36.4% in the home, 36.2% in the local, and 24.3% in the state quarantine group. Nicotine addiction did not significantly differ among the three groups ($p = 0.099$). Most participants reported mild nicotine addiction, ranging from 75.8% in the home quarantine group to 87.7% in the state quarantine group. Moderate-to-severe addiction was more common in the home (24.3%) and local (21.8%) quarantine groups than in the state quarantine group (12.3%). The state and home quarantine groups had significantly higher knowledge scores regarding smoking-related diseases (5.0 ± 2.2 and 4.7 ± 2.5 , respectively) than the local quarantine group (3.6 ± 2.4 ; $p < 0.001$). Similarly, knowledge scores on COVID-19-related diseases were higher in the state and home quarantine groups (4.3 ± 2.4 and 3.8 ± 2.5 , respectively) than in the local quarantine group (2.5 ± 2.5 ; $p < 0.001$).

Figure 1 illustrates the average number of cigarettes smoked per day before, during, and after quarantine, by quarantine type. Before quarantine, smokers in all groups smoked approximately 10 cigarettes per day. During quarantine, the number of cigarette smokers decreased by more than half in the local and state groups, whereas a relatively similar number was observed in the home group. However, after quarantine, the average number of cigarettes smoked in the local and state groups

returned to levels almost identical to those before quarantine.

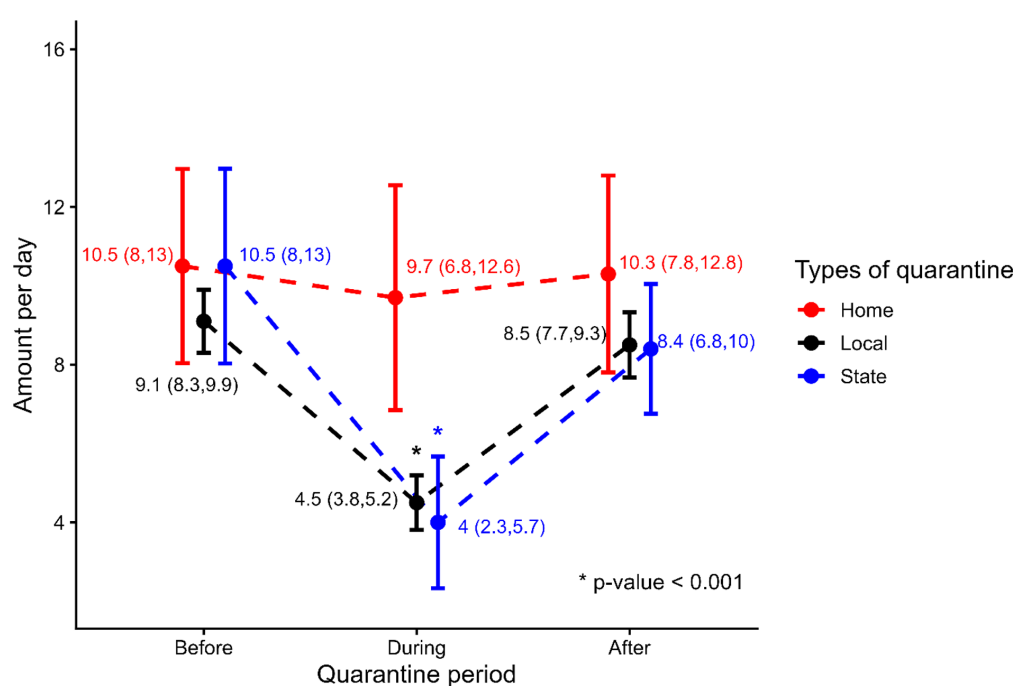
Table 3 presents the results of a multiple linear regression examining factors associated with the number of cigarettes consumed per day during quarantine. Compared with smokers who perceived no smoking control measures, those who were aware of full smoking control during quarantine smoked fewer cigarettes per day (adjusted $\beta = -3.68$; 95% CI: $-5.459 - -1.86$). In addition, participants who were unsure about the smoking control measures also reported a significantly lower number of cigarettes per day (adjusted $\beta = -2.77$; 95% CI: $-5.13 - -0.41$). A nonlinear dose-response relationship (test for trend, $p = 0.019$) was observed among individuals who were fully aware, unaware, and partially aware of smoking restrictions. In contrast, when compared to smokers who had mild nicotine addiction scores, those who had moderate and high addiction scores smoked a higher number of cigarettes per day (adjusted $\beta = 1.92$; 95% CI: $0.03 - 3.81$, and adjusted $\beta = 4.13$; 95% CI: $0.78 - 7.47$, respectively). The higher the addictive score, the greater the number of cigarette smokers (test for trend, $p = 0.016$). Knowledge of smoking-related diseases and COVID-19-related diseases was not significantly associated with the number of cigarettes consumed during quarantine.

DISCUSSION

Quarantine measures have significantly limited tobacco consumption by limiting access to tobacco products. Factors associated with smoking during quarantine in our study were awareness of strict smoking control measures and levels of nicotine addiction. Despite a reduction in smoking during the quarantine period, it subsequently increased to almost the same level as before the quarantine.

These findings suggested that smoking control measures during quarantine and restricted tobacco access may support smoking reduction or cessation. The 14 day quarantine period may also have provided an opportunity for smokers to attempt smoking cessation in a controlled environment, particularly among those who expressed a desire to quit smoking. As shown in India, 11.3% of tobacco users reported quitting during the lockdown, with

Figure 1. Average number of cigarettes smoked per day among quarantine participants before, during, and after quarantine in southern Thailand in 2021 (N=318)



reduced access being a strong motivator¹⁸. Similarly, in South Africa, the smoking prevalence has declined notably, with 16% to 49% of smokers

ceasing smoking entirely during prohibition¹⁹. A survey revealed a significant decrease in smoking prevalence, with COVID-19-positive individuals

Table 3. Factors associated with the number of cigarettes consumed during quarantine among current smokers in southern Thailand in 2021 (N=318)

Factors	Adjusted β^* (95% CI)	p
Perception of smoking control measures		
No control (ref.)		
Unknown	-2.77 (-5.13 – -0.41)	0.021
Full control	-3.68 (-5.49 – -1.86)	<0.001
Partial control	-1.74 (-3.53–0.05)	0.056
Education level		
No formal school education (ref.)		
Primary school	0.12 (-3.14–3.38)	0.941
Secondary school or higher	0.70 (-2.50–3.90)	0.667
Severity of nicotine addiction		
Mild (ref.)		
Moderate	1.92 (0.03–3.81)	0.047
Severe	4.13 (0.78–7.47)	0.016
Knowledge score on diseases caused by smoking	0.08 (-0.29–0.45)	0.686
Knowledge score on COVID-19-related diseases	-0.26 (-0.59–0.08)	0.131

*Values of adjusted β coefficients were estimated from an adjusted multiple linear regression indicating the number of cigarettes consumed per day during quarantine compared to the reference group.

reducing their daily cigarette consumption by an average of 10.14 ± 7.86 cigarettes per day, approximately twice that of our study participants who were not yet infected²⁰. Additionally, a substantial reduction in daily cigarette consumption was reported among participants enrolled in a tobacco cessation and lung cancer screening program during the COVID-19 period²¹.

The findings of this study partly align with those of prior research, demonstrating that strict smoking control measures and increased awareness of health risks work synergistically to reduce smoking prevalence. Moreover, previous research indicated that a motivation to reduce smoking was linked to health concerns and perceived risks associated with the COVID-19 virus^{5,22}.

Our study revealed a regression towards the mean in smoking from before to during and after quarantine. Despite a reduction in smoking during the quarantine period, smoking subsequently increased to almost the same level as before the quarantine. Consistently, previous research has reported that the majority of participants (approximately 40%) decreased smoking during the pandemic, whereas 35.6% increased smoking after the pandemic²³. Therefore, implementing strong smoking control measures in quarantine settings could initiate smoking reduction. However, once individuals leave quarantine and return to their everyday environments, continued support and services are necessary to maintain these positive changes, as many risk reverting to their previous smoking habits if there are no ongoing measures in place. Without appropriate smoking cessation support, the smoking reduction has not been sustained.

In this context, a telephone-based cessation service offers a feasible and effective approach. A study among COVID-19 patients revealed that 75% of participants considered such support helpful, leading to increased attempts to quit²⁴. Another study reported a 37% cessation rate after the implementation of a remote program that included education and counseling during the pandemic²⁵. A study revealed that 41.7% of tobacco users in isolation centers accepted cessation treatment, demonstrating the feasibility of successful outreach in emergency settings²⁶.

Strengths and limitations

Our study included measures of smoking before, during, and after discharge from the quarantine facilities, with an adequate sample size. However, several limitations should be considered. First, the cross-sectional design limited causal inference about the relationship between quarantine conditions and changes in smoking behavior. Second, smoking behaviors were self-reported and may have been affected by recall or social desirability bias. Third, the study was conducted in southern Thailand, which may limit the generalizability of the findings to other settings or populations.

CONCLUSIONS

The quarantine environments where smoking was controlled are significantly associated with lower cigarette consumption. The regression towards the mean phenomenon highlights that, without appropriate support for smoking cessation after being discharged from quarantine, smoking consumption gradually increased to their baseline smoking behaviors. Further intervention studies to support these findings should be conducted to prepare for a similar pandemic in the future.

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CONFLICTS OF INTEREST

The authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none was reported.

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ETHICAL APPROVAL AND INFORMED CONSENT

Ethical approval was obtained from the Ethics Committee of the Faculty of Medicine, Prince of Songkla University (Approval number: REC: 63-328-18-1; Date: ...). Participants provided informed consent.

DATA AVAILABILITY

The data supporting this research are available from the authors on reasonable request.

PROVENANCE AND PEER REVIEW

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