

## “Quit to Win 2012” and smoking cessation

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### 1. Introduction

According to Census & Statistics Department, the prevalence of smoking in Hong Kong was 10.7% in 2012<sup>1</sup>. Smoking kills over 7,000 people per year<sup>2</sup>. Smoking led to an annual medical cost, long-term care and productivity loss of US\$688 million in 1998<sup>3</sup>, which was equivalent to 0.6% of GDP in the region<sup>4</sup>. Tobacco is addictive and it is difficult for some smokers to quit smoking without assistance. Furthermore, over half of the daily smokers in Hong Kong had never tried to quit and did not want to quit, so they were unlikely to seek professional help from the smoking cessation services<sup>1</sup>.

The Quit and Win Contest provided an opportunity to reach a large group of smokers. It aimed to promote smoking cessation in the community and use incentives to motivate smokers to quit<sup>5</sup>. Since 2009, Hong Kong Council on Smoking and Health (COSH), School of Nursing and School of Public Health of the University of Hong Kong (HKU) have launched Quit to Win Contests to deliver brief smoking cessation interventions to the smokers in the community and assess their effectiveness. In 2009, a 3-arm randomized controlled-trial (RCT) tested the effectiveness of brief smoking cessation advice by telephone or short message services (SMS), compared to delivering a self-help smoking cessation booklet, on quit rates and changes in smoking behaviors in smokers of the Quit to Win Contest<sup>6</sup>. A

total of 1,119 participants were recruited from 31 recruitment activities in 14 districts within one and half months. At 6-month follow-up, the self-reported quit rate was 22%. However, no difference in the self-reported quit rate was found among the 3 RCT groups. In 2010, we conducted another 2-arm RCT in the Quit to Win Contest 2010 to assess the effectiveness in achieving abstinence and changing smoking behavior of an on-site face-to-face brief smoking cessation advice compared to delivering the self-help smoking cessation booklet only. We recruited 1,139 participants during a period of two and a half months. A higher quit rate was observed in the intervention group (18.4%) than the control group (13.8%) at 6-month follow-up, but it was marginally significant ( $p=0.08$ )<sup>7</sup>. In total, both Quit to Win Contests attracted over 2,000 smokers in the community to participate and helped them to quit with the brief advices and incentives.

In 2012, COSH, HKU, 18 District Councils and 10 non-government organizations (NGOs) collaborated to organize the Quit to Win Contest to raise public awareness on smoking cessation and recruit smokers to join the Contest. A 3-arm RCT was conducted to evaluate the effectiveness of a brief smoking cessation advice delivered by a trained counselor onsite (Counseling group), or sending them mobile phone messages (SMS group), compared to delivering a self-help smoking cessation booklet only (Control group).

## 2. Methods

### 2.1 Recruitment

To recruit participants in the Contest, 161 recruitment sessions were held in shopping malls and public areas in 18 districts in Hong Kong from 19 July to 30 September 2012. Trained smoking cessation counselors screened participants with the following eligibility for the Contest:

1. Hong Kong residents aged 18 or above;
2. Daily smokers who smoked at least 1 cigarette per day in the past 3 months;
3. Able to communicate in Cantonese and read Chinese;
4. Had a local network mobile phone to receive SMS; and
5. Exhaled carbon monoxide (CO) of 4 ppm or above.

After obtaining written consent from the participants, the trained smoking cessation counselors administered the baseline questionnaire, measured the exhaled CO level, provided the self-help smoking cessation booklet to the participants and assigned them a unique participation number. Eligible participants who were unwilling to join the RCT could join the Quit to Win Contest, but were allocated to the Non-RCT group. Smokers who were physiologically or physically unable to communicate or currently following other forms of smoking cessation programme were excluded from RCT.

Cluster randomization method was used to allocate participants into one of the following 3 groups: Counseling group, SMS group or Control group. Eighteen numbers were generated and randomly assigned to the 18 districts, with the random function in EXCEL. The 6 districts with the 6 smallest numbers were allocated to the Counseling group, and the other 6 districts ranked from 7th to 12th were allocated to the SMS group. The rest of the districts were allocated to the Control group.

### 2.2 Intervention and Follow-up

**Counseling group:** Participants in the Counseling group received 5-minute brief smoking cessation counseling by our trained smoking cessation counselors at the recruitment sites. They received advice on quitting smoking and specific warning about the health hazards of smoking, based on the AWARD model including (1) Ask the smoking and quitting history; (2) Warn them about the harm of smoking (1 in 2 smokers would die of diseases due to smoking); (3) Advise them to quit; (4) Refer them to smoking cessation services and (5) Repeat the above steps (Do-it-again). A health education card containing brief advices and self-assessment of decision balance between smoking and quitting was also provided to the participants. Additional telephone counseling at the 1-week & 1-month follow-up was provided to the participants in this group.

**SMS group:** Participants in the SMS group received SMS text messages of smoking cessation advice and warning on the health hazards of smoking. Participants who reported that they started to quit within 30 days or less were classified as “ready to quit”, whereas those reported to quit after 30 days or more, or had not decide to quit were classified as “not ready to quit”. Two sets of 16 messages tailored for the two groups of smokers were sent within 4 weeks after recruitment (Appendix 1).

**Control group:** Participants in the Control group received a 12-page self-help smoking cessation booklet but did not receive any additional quitting assistance.

**Non-trial group:** This group included participants who wanted to join the TV programme. They received a self-help smoking cessation booklet but not any additional smoking cessation counseling and were not included in the RCT.

All participants were provided the 12-page self-help smoking cessation booklet, and followed up at 3 months and 6 months after baseline recruitment. Trained smoking cessation counselors, who were blinded to the group assignment, conducted the telephone survey using a standardized questionnaire. The interviewers made at least seven call attempts, at different time of a day, to reach each participant. Those who failed to be contacted in all attempts were classified as loss to follow-up. Those who reported no

smoking in the past 7 days were invited to participate in a biochemical validation including measurement of exhaled carbon monoxide (CO) and salivary cotinine levels. The standard for validated abstinence was that exhaled CO level below 4 ppm and salivary cotinine below 10ng/ml. Participants who passed the biochemical validation at the 3-month follow-up were included in the lucky draw, which selected 5 participants to win a HK\$10,000 gift voucher for each. For those who joined the TV programme co-produced with Television Broadcast Limited (TVB), the champion received a cash prize of HK\$20,000, 1<sup>st</sup> runner-up received HK\$10,000 and 2<sup>nd</sup> runner-up received HK\$5,000.

The primary outcome of the RCT was self-reported 7-day point prevalence (PP) quit rate at the 3- and 6-month follow-ups. The secondary outcomes were biochemically validated quit rate, rate of smoking reduction by at least 50%, and quit attempts (stopped smoking for at least 24 hours since participating in the Contest) at the 3-month and 6-month follow-ups.

The socio-demographic and smoking characteristics at baseline of all subjects (N=1,193) were described. We compared the primary and secondary outcomes, reasons to quit (in self-reported quitters), methods to quit (in self-reported quitters), reasons of continuing smoking (in smokers), perceived importance, difficulty and confidence to quit among the three groups. We adopted the intention-to-treat (ITT) analysis (assuming that non-respondents at the follow-up did not change their baseline smoking behavior) to calculate the self-reported and biochemically validated quit rates, and used complete-case (CC) analysis (excluding participants who were lost to follow-up) for other outcomes.

### 3. Results

In all the 161 recruitment sessions, a total of 1,247 smokers visited the smoking cessation booths. 1,193 (95.7%) of them were eligible and consented to participate in the Contest. Of the 1,193 participants, 265 (22.2%) were allocated to the Counseling group, 419 (35.1%) to the SMS group, 432 (36.2%) to the Control group and 77 (6.5%) were allocated to the Non-trial group.

#### *Baseline results*

##### 3.1 Demographic characteristics of all participants

Table 1 shows that, in all participants, 79.0% were male, and the average age was 42.1 years (SD=16.9). Nearly 60% of the participants (58.2%) were married. More than half (52.9%) had one or more children. 42.6% had junior secondary education level or below, and the majority (69.7%) were employed. 28.2% had monthly household income less than HK\$10,000. The Control group had slightly higher proportion of students (Counseling: 2.6%, SMS: 4.5%, Control: 8.3%,  $p<0.01$ ) and retired persons (Counseling: 12.1%, SMS: 12.4%, Control: 19.1%,  $p<0.01$ ) than the Counseling and SMS groups.

**Table 1 Demographic characteristics of all participants (N=1,193)<sup>1</sup>**

	Total	Non-trial	Counseling	SMS	Control
	N=1,193	N=77	N=265	N=419	N=432
	(n, %)	(n, %)	(n, %)	(n, %)	(n, %)
<b>Gender</b>					
Male	943 (79.0)	62 (80.5)	209 (78.9)	344 (82.1)	328 (75.9)
Female	250 (21.0)	15 (19.5)	56 (21.1)	75 (17.9)	104 (24.1)
<b>Age, mean (SD)</b>					
	42.1 (16.9)	38.5 (14.9)	41.6 (15.2)	43.0 (16.3)	42.6 (18.6)
<b>Marital status</b>					
Single	463 (38.8)	37 (48.1)	89 (33.6)	153 (36.5)	184 (42.6)
Married/ Cohabited	694 (58.2)	38 (49.4)	166 (62.6)	254 (60.6)	236 (54.6)
Other	25 (2.1)	2 (2.6)	8 (3.0)	5 (1.2)	10 (2.3)
<b>Child</b>					
None	538 (45.1)	43 (55.8)	113 (42.6)	174 (41.5)	208 (48.1)
One child	241 (20.2)	15 (19.5)	66 (24.9)	85 (20.3)	75 (17.4)
Two children	252 (21.1)	13 (16.9)	54 (20.4)	98 (23.4)	87 (20.1)
Three or more children	138 (11.6)	6 (7.8)	27 (10.2)	49 (11.7)	56 (13.0)
<b>Education level</b>					
No formal education	19 (1.6)	0 (0.0)	3 (1.1)	6 (1.4)	10 (2.3)
Elementary education	165 (13.8)	6 (7.8)	36 (13.6)	60 (14.3)	63 (14.6)
Junior secondary education	325 (27.2)	15 (19.5)	77 (29.1)	127 (30.3)	106 (24.5)
Senior secondary education	443 (37.1)	34 (44.2)	96 (36.2)	145 (34.6)	168 (38.9)
Post-secondary or above	231 (19.4)	22 (28.6)	50 (18.9)	76 (18.1)	83 (19.2)
<b>Employment status</b>					
Student	65 (6.4)	3 (3.9)	7 (2.6)	19 (4.5)	36 (8.3)
Self-employed/Employed	831 (69.7)	54 (70.1)	197 (74.3)	301 (71.8)	279 (64.6)
Unemployed	55 (4.6)	7 (9.1)	15 (5.7)	24 (5.7)	9 (2.1)
Housewife	46 (3.9)	2 (2.6)	7 (2.6)	17 (4.1)	20 (4.6)
Retired	174 (14.6)	8 (10.4)	32 (12.1)	52 (12.4)	82 (19.0)
<b>Monthly household income (HKD)</b>					
Less than \$10,000	336 (28.2)	19 (24.7)	78 (29.4)	104 (24.8)	135 (31.3)
\$10,000-19,999	455 (38.1)	27 (35.1)	83 (31.3)	177 (42.2)	168 (38.9)
\$20,000-29,999	171 (14.3)	11 (14.3)	47 (17.7)	58 (13.8)	55 (12.7)
\$30,000-39,999	88 (7.4)	7 (9.1)	22 (8.3)	37 (8.8)	22 (5.1)
\$40,000 or more	109 (9.1)	10 (13.0)	30 (11.3)	28 (6.7)	41 (9.5)

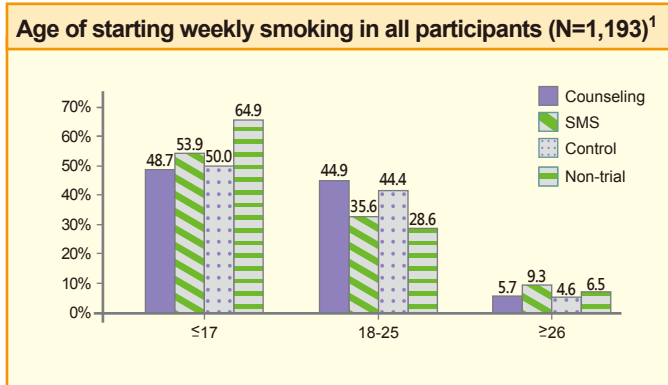
<sup>1</sup>Missing data was excluded

### 3.2 Smoking profile

Overall, the mean age of starting smoking was 18 (SD=5.7), and more than half (52.1%) started smoking before 18 (Figure 1). Their mean daily cigarette consumption was 13.5 (SD=9.0), 42.6% consumed 5-14 cigarettes and 34.7% consumed 15-24 per day (Figure 2). 62.9% had previous quit attempts (stopped smoking for at least 24 hours in lifetime). More participants in the

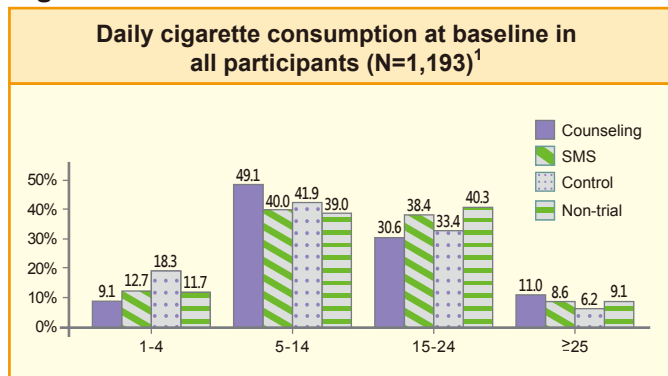
Counseling group had previous quit attempts than the Control group (Counseling: 67.6%, Control: 58.6%,  $p=0.02$ ) (Figure 3). 69.3% wanted to quit within 30 days (ready to quit), with more participants in the Control group than the other groups being not ready to quit (Counseling: 28.3%, SMS: 20.0%, Control: 41.6%,  $p<0.01$ ).

**Figure 1**



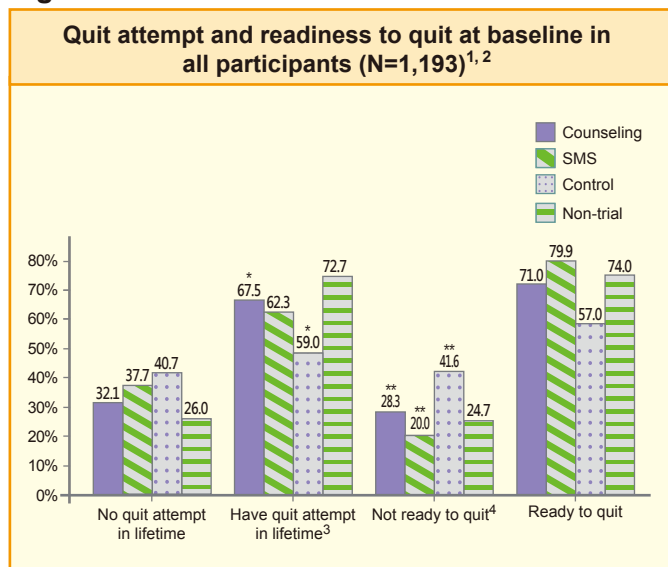
<sup>1</sup> Missing data were excluded

**Figure 2**



<sup>1</sup> Missing data were excluded

**Figure 3**



<sup>1</sup> Missing data were excluded

<sup>2</sup> Participants who were ready to quit included those who wanted to quit within 30 days, while those not ready to quit included those who wanted to quit after 30 days or more, and those who had not decided to quit

<sup>3</sup> p-value for comparing Counseling and Control group = 0.02

<sup>4</sup> p-value for comparing Counseling and Control group < 0.01; p-value for comparing SMS and Control group < 0.01

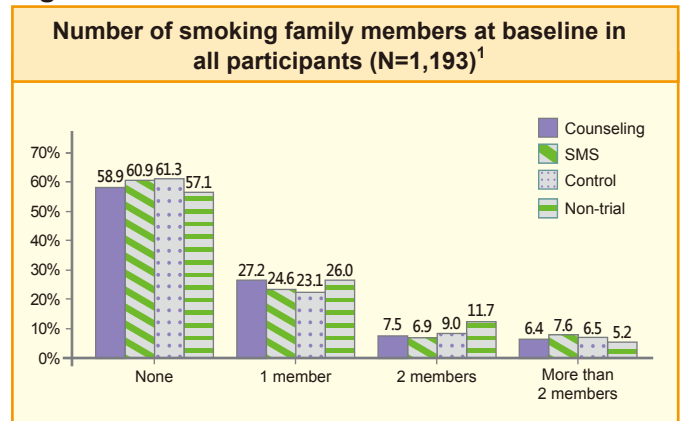
\*p<0.05, \*\*p<0.01

### 3.3 Environmental influence

The major sources of perceived support in the quitting process at baseline were (1) spouse (45.4%), (2) children (32.6%), (3) parents (29.7%) and (4) friends (18.4%). On the contrary, 12.2% of them did not receive any support from others. There was no significant difference in receiving support from the spouse and children among the three RCT groups, but a smaller proportion of SMS group received support from parents (SMS: 24.3%, Control: 32.9%, p<0.01) and siblings (SMS: 6.7%, Control: 12.5%, p<0.01) than the Control group.

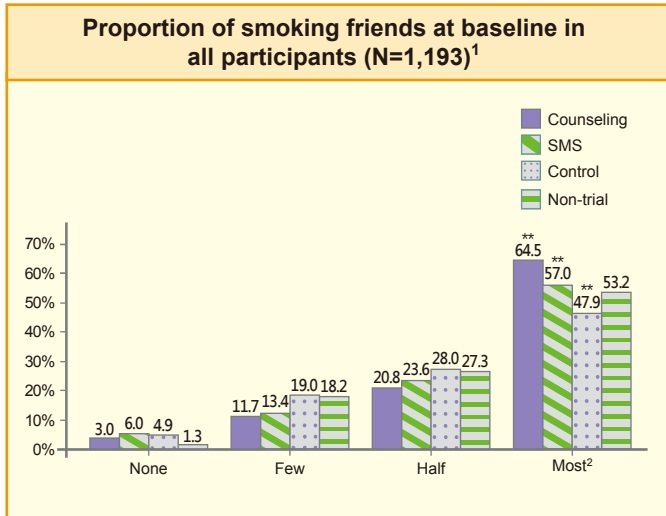
In all participants, 39.6% lived with smoking family members, and there was no significant difference among the three RCT groups (Counseling: 41.1%, SMS: 39.1%, Control: 38.7%, p>0.05) (Figure 4). The majority (80.0%) claimed that more than half of their friends were smokers (Figure 5), while 60.1% mentioned that more than half of their colleagues were smokers (Figure 6). There was no significant difference in the number of smoking family members among the three RCT groups, but the differences in proportion of smoking friends and colleagues among the three RCT groups were significant. A higher proportion of the Counseling group (64.5%) and SMS group (57.0%) had most of their friends smoking than the Control group (47.9%) (p<0.01). A higher proportion in the Counseling group (44.2%) and SMS group (38.4%) had most of their colleagues smoking than the Control group (32.9%) (p<0.01).

**Figure 4**



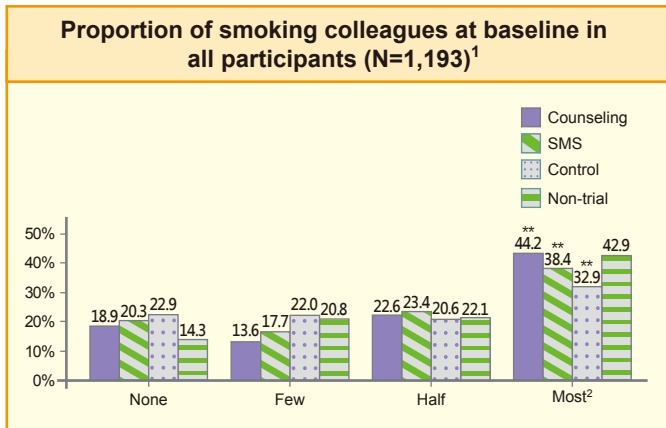
<sup>1</sup> Missing data were excluded

**Figure 5**



<sup>1</sup> Missing data were excluded  
<sup>2</sup> p-value for comparing Counseling and Control group < 0.01; p-value for comparing SMS and Control group < 0.01  
 \*\*p<0.01

**Figure 6**



<sup>1</sup> Missing data were excluded  
<sup>2</sup> p-value for comparing Counseling and Control group < 0.01; p-value for comparing SMS and Control group < 0.01  
 \*\*p<0.01

**3- and 6-month follow-up results**

**3.4 Retention rate**

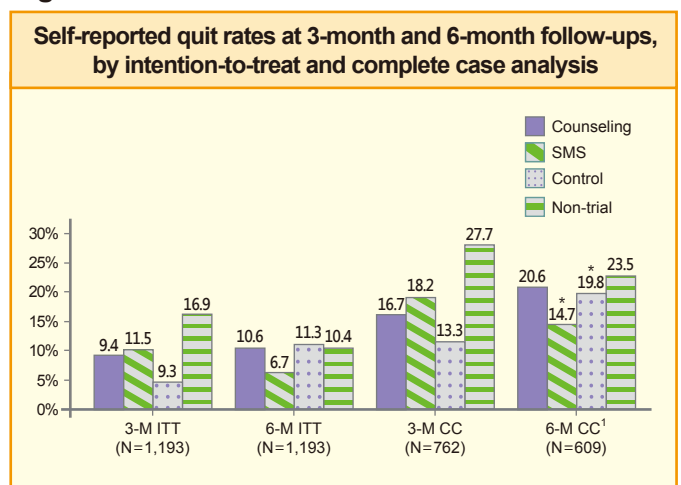
At the 3-month follow-up, the overall retention rate was 64.0%, with 56.6% in the Counseling group, 63.0% in the SMS group and 69.7% in the Control group. There was no significant difference in the retention rate among the three RCT groups (p=0.11). At the 6-month follow-up, the overall retention rate was 51.5%, with 51.3% in the Counseling group, 45.6% in the SMS group and 57.4% in the Control group, and the difference among the 3 groups was significant (p=0.01).

**3.5 Self-reported and biochemically validated quit**

By ITT analysis, the overall self-reported 7-day point prevalence quit rate at 3-month and 6-month follow-up was 10.6% (95% CI=8.9%-12.6%) and 9.5% (95% CI= 7.9%-11.4%), respectively (Figure 7). No significant difference in the 3-month and 6-month quit rate by ITT analysis among the three RCT groups was found (all p>0.05). By CC analysis, the overall self-reported quit rate at 3 months and 6 months were 16.5% and 18.6%, respectively. The Control group had a significantly higher quit rate by CC analysis than the SMS group at the 6-month follow-up (SMS: 14.7%, Control: 19.8%, p=0.02). The difference in the self-reported quit rate between Counseling and Control group was not significant (Counseling: 20.6% ; Control: 19.8% , p>0.05).

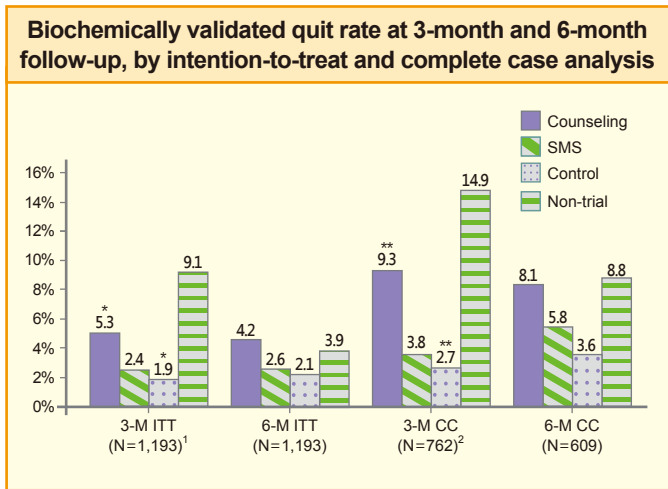
In the 126 self-reported quitters at 3 months, 48 participated in the biochemical validation, and 81.3% (39/48) passed (Figure 8). At 6 months, 37 of the 113 self-reported quitters participated in the validation, and 91.9% (34/37) passed. By ITT analysis, the validated quit rate for all the participants at 3 and 6 months was 3.3% (95% CI=2.4%-4.5%) and 2.8% (95% CI= 2.0%-3.9%), respectively. By both ITT and CC analysis, the Counseling group (ITT: 5.3%, CC: 9.3%) had a higher validated quit rate than the Control group (ITT: 1.9%, CC: 2.7%) (p for ITT analysis=0.03; p for CC<0.01).

**Figure 7**



ITT: Intention-to-treat analysis; CC: Complete-case analysis  
<sup>1</sup> p-value for comparing SMS and Control group =0.02  
 \*p<0.05

**Figure 8**



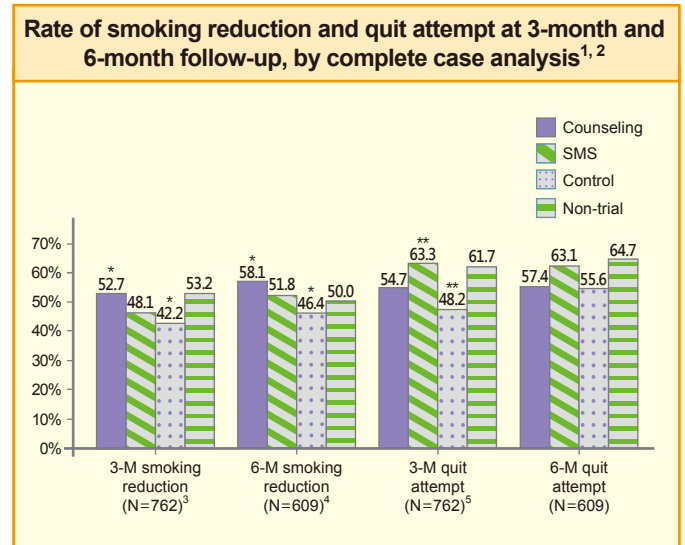
ITT: Intention-to-treat analysis; CC: Complete-case analysis  
<sup>1</sup> p-value for comparing Counseling and Control group = 0.03  
<sup>2</sup> p-value for comparing Counseling and Control group < 0.01  
 \*p<0.05, \*\*p<0.01

### 3.6 Quit attempt and smoking reduction at the 3- and 6-month follow-up

At the 3-month follow-up, 47% of participants (including quitters), who were successfully followed up, reduced cigarette consumption by at least 50% compared to baseline (Figure 9). The proportion of smoking reduction at the 6-month follow-up was 50.9%. The rate of smoking reduction was higher in the Counseling group (3-month: 52.7%, 6-month: 58.1%) than Control group (3-month: 42.2%, 6-month: 46.4%) at the 3- and 6-month follow-up (p for 3-month=0.04, p for 6-month=0.03). No significant difference between SMS and Control group was found in both follow-ups.

The overall rate of quit attempt (stopped smoking for at least 24 hours since participating in the Quit to Win Contest, including quitters) for the 3- and 6-month follow-up was 55.4% and 58.3%, respectively (Figure 9). The SMS group had a higher rate of quit attempt than the Control group at the 3-month follow-up (SMS: 63.3%, Control: 48.2%, p<0.01). There was no significant difference at the 6-month follow-up among the 3 RCT groups.

**Figure 9**

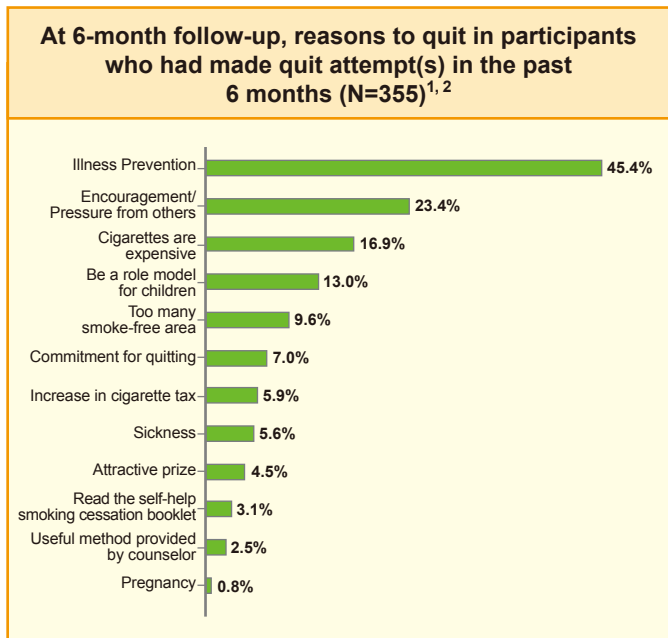


<sup>1</sup> Missing data were excluded  
<sup>2</sup> Quitters were included in those who reduced cigarette consumption and quit attempt  
<sup>3</sup> p-value for comparing Counseling and Control group = 0.04  
<sup>4</sup> p-value for comparing Counseling and Control group = 0.03  
<sup>5</sup> p-value for comparing SMS and Control group < 0.01  
 \*p<0.05, \*\*p<0.01

### 3.7 Reasons and methods of quit attempts at the 6-month follow-up

At 6-month follow-up, in the participants who had made quit attempt(s) in the study period, the most common reasons of quit attempt were: (1) illness prevention (45.4%), (2) received encouragement or pressure from others to quit smoking (23.4%), (3) expensive cigarettes (16.9%) and (4) being a role model for children (13.0%) (Figure 10). More participants in the Counseling group and SMS group made their quit attempt because of illness prevention (Counseling: 67.9%, SMS: 47.9%, Control: 35.5%, p<0.01). More participants in the Control group had made their quit attempt because of expensive cigarettes (Counseling: 16.7%, SMS: 10.3%, Control: 23.2%, p=0.02), too many smoke-free areas (Counseling: 5.1%, SMS: 0.9%, Control: 21.0%, p<0.01), increase in cigarette taxation (Counseling: 0%, SMS: 1.7%, Control: 13.8%, p<0.01), and being a role model for children (Counseling: 6.4%, SMS: 10.3%, Control: 18.1%, p=0.03)

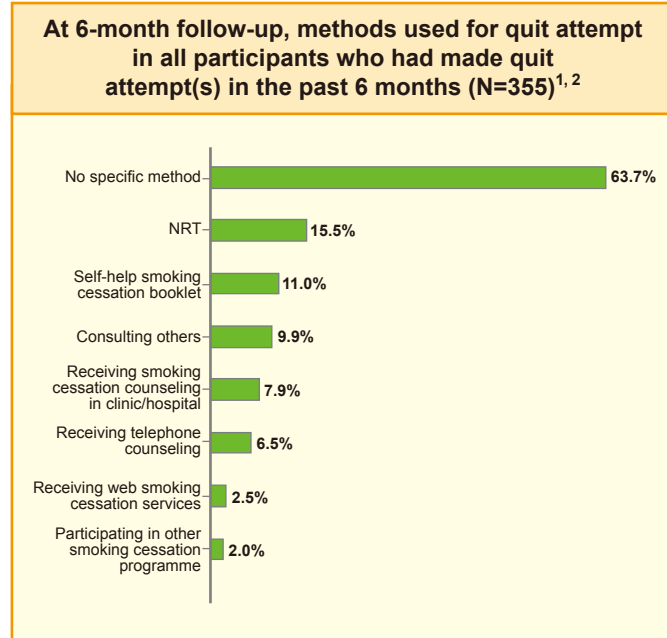
**Figure 10**



<sup>1</sup> Participants who were lost to follow up were excluded

<sup>2</sup> Participants were allowed to choose more than one reason

**Figure 11**



<sup>1</sup> Participants who were lost to follow up were excluded

<sup>2</sup> Participants were allowed to choose more than one method

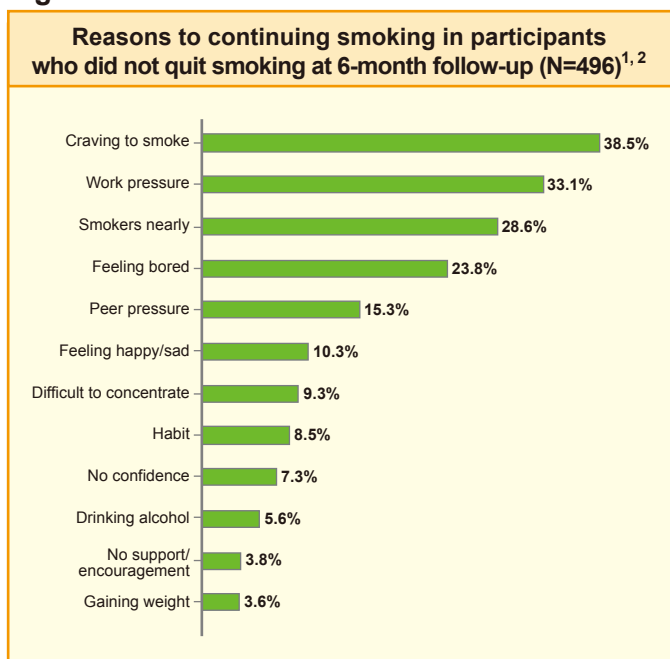
At the 6-month follow-up, the majority (63.7%) in participants who had made quit attempt(s) did not use any specific methods to quit (Figure 11). The most common methods were using nicotine replacement therapy (NRT) (15.5%) and self-help smoking cessation booklet (11.0%). More participants who had made a quit attempt in the Counseling group and SMS group did not use specific methods to quit smoking compared with the Control group (Counseling: 66.7%, SMS: 82.9%, Control: 45.7%,  $p < 0.01$ ). Moreover, more participants in the Control group than the other groups used NRT (Counseling: 12.8%, SMS: 7.7%, Control: 25.4%,  $p < 0.01$ ), consulted others (Counseling: 1.3%, SMS: 0.9%, Control: 23.9%,  $p < 0.01$ ), read self-help smoking cessation booklet (Counseling: 5.1%, SMS: 2.6%, Control: 21.0%,  $p < 0.01$ ), received counseling from clinic/hospital (Counseling: 5.1%, SMS: 2.6%, Control: 15.2%,  $p < 0.01$ ) and received telephone counseling (Counseling: 3.8%, SMS: 0%, Control: 14.5%,  $p < 0.01$ ).

### 3.8 Reasons of continuing smoking

The four most common reasons of continuing smoking in participants who had not quit at 6 months were: (1) craving to smoke (38.5%), (2) work pressure (33.1%), (3) smokers nearby (28.6%), and (4) feeling bored (23.8%) (Figure 12). Participants in the Control group were more likely to continue smoking than the Counseling group and SMS group due to “craving to smoke” (Counseling: 31.5%, SMS: 32.1%, Control: 48.0%,  $p < 0.01$ ). More participants in the Counseling group than the Control group continued to smoke due to “work pressure” (Counseling: 45.4%, SMS: 25.9%, Control: 31.5%,  $p < 0.01$ ). Fewer participants in the SMS group continued to smoke due to “smokers nearby” (Counseling: 37.0%, SMS: 19.8%, Control: 31.5%,  $p < 0.01$ ).



**Figure 12**



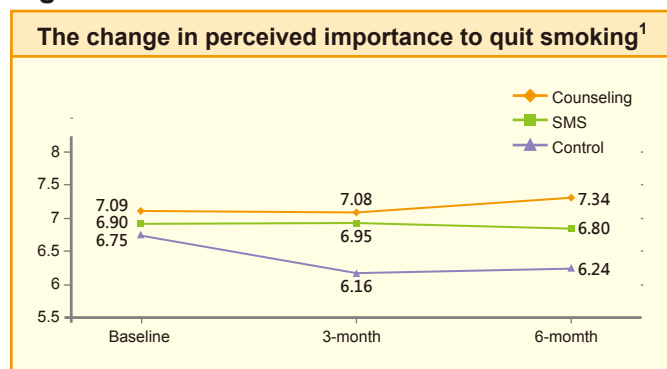
<sup>1</sup> Participants who were lost to follow up were excluded  
<sup>2</sup> Participants were allowed to choose more than one reason

### 3.9 Self-perceived importance, confidence, and difficulty to quit smoking

In a scale of 0 (minimum) to 10 (maximum), the mean score of “perceived level of importance to quit smoking”, “perceived level of difficulty to quit smoking”, and “perceived level of confidence to quit smoking” at baseline was 6.89 (SD = 2.68), 6.64 (SD = 2.84), 5.53 (SD = 2.51), respectively.

The mean score of perceived importance in the Control group decreased significantly from 6.75 at baseline to 6.16 at 3 months ( $p = 0.02$ ). In the Counseling and SMS groups, the mean score of perceived importance at 3 and 6 months was similar to the baseline (all  $p > 0.05$ ). The mean score of the Counseling group (7.08) and SMS group (6.95) was greater than the Control group (6.16) at 3 months ( $p$  for Counseling versus Control  $< 0.01$ ;  $p$  for SMS versus Control  $< 0.01$ ). The greater mean score in the Counseling and SMS group was also observed at the 6-month follow-up ( $p$  for Counseling versus Control  $< 0.01$ ,  $p$  for SMS versus Control  $= 0.04$ ). It can be concluded that the on-site brief counseling and SMS maintained the perceived importance, while participants without the brief intervention had decreased perceived importance over the study period (Figure 13).

**Figure 13**

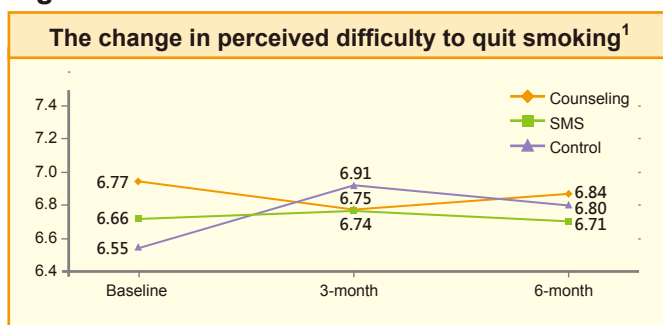


Within-group pair-sample t-test:  
 Counseling:  $p$ -value for Baseline versus 3-month=0.57  
 $p$ -value for Baseline versus 6-month=0.38  
 SMS:  $p$ -value for Baseline versus 3-month=0.91  
 $p$ -value for Baseline versus 6-month=0.13  
 Control:  $p$ -value for Baseline versus 3-month=0.02  
 $p$ -value for Baseline versus 6-month=0.34  
 Between group independent t-test  
 Baseline:  $p$ -value for Counseling versus Control=0.12  
 $p$ -value for SMS versus Control=0.40  
 3-month:  $p$ -value for Counseling versus Control $<0.01$   
 $p$ -value for SMS versus Control $<0.01$   
 6-month:  $p$ -value for Counseling versus Control $<0.01$   
 $p$ -value for SMS versus Control=0.04

<sup>1</sup> Participants who were lost to follow up were excluded

The mean score of perceived difficulty to quit at 3 and 6 months was similar to the baseline in the three RCT groups (all  $p > 0.05$ ). The scores were also similar among the three RCT groups at all the follow-ups (all  $p > 0.05$ ) (Figure 14).

**Figure 14**

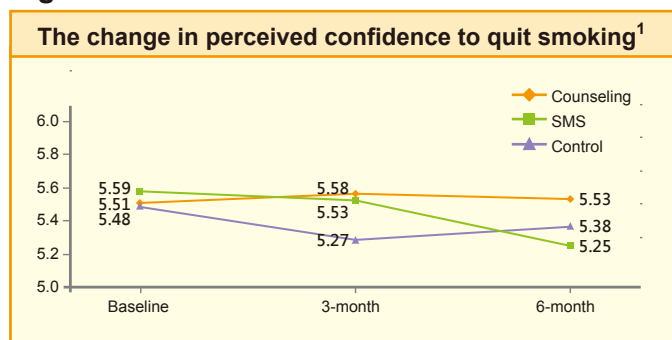


Within-group pair-sample t-test:  
 Counseling:  $p$ -value for Baseline versus 3-month=0.75  
 $p$ -value for Baseline versus 6-month=0.84  
 SMS:  $p$ -value for Baseline versus 3-month=0.49  
 $p$ -value for Baseline versus 6-month=0.17  
 Control:  $p$ -value for Baseline versus 3-month=0.07  
 $p$ -value for Baseline versus 6-month=0.58  
 Between group independent t-test  
 Baseline:  $p$ -value for Counseling versus Control=0.34  
 $p$ -value for SMS versus Control=0.58  
 3-month:  $p$ -value for Counseling versus Control=0.49  
 $p$ -value for SMS versus Control=0.38  
 6-month:  $p$ -value for Counseling versus Control=0.90  
 $p$ -value for SMS versus Control=0.71

<sup>1</sup> Participants who were lost to follow up were excluded

The mean score of perceived confidence to quit at 3 and 6 months was similar to the baseline in the three RCT groups (all  $p>0.05$ ). The scores were also similar among the three RCT groups at all the follow-ups (all  $p>0.05$ ) (Figure 15).

**Figure 15**



Within-group pair-sample t-test:

Counseling: p-value for Baseline versus 3-month=0.92

p-value for Baseline versus 6-month=0.43

SMS: p-value for Baseline versus 3-month=0.50

p-value for Baseline versus 6-month=0.07

Control: p-value for Baseline versus 3-month=0.49

p-value for Baseline versus 6-month=0.81

Between group independent t-test

Baseline: p-value for Counseling versus Control=0.90

p-value for SMS versus Control=0.52

3-month: p-value for Counseling versus Control=0.25

p-value for SMS versus Control=0.23

6-month: p-value for Counseling versus Control=0.62

p-value for SMS versus Control=0.62

<sup>1</sup> Participants who were lost to follow up were excluded

### 3.10 Predictors of abstinence at 6-month follow-up

Using the generalized estimating equations (GEE) model, with ITT analysis for abstinence, the predictors of abstinence included (1) having previous quit attempts within the past month (Adjusted OR=2.04, 95% CI=1.03-4.01) or within the past 6 months (Adjusted OR=1.72, 95% CI=1.03-2.85), compared to those who never tried to quit; (2) married/cohabited (Adjusted OR=1.82, 95% CI=1.15-2.86) or widowed/divorced (Adjusted OR=3.89, 95% CI=1.85-8.19), compared with those who were single; (3) smoked 1-4 cigarettes a day at baseline (Adjusted OR=1.64, 95% CI=1.05-2.56), compared with those who smoked 5-14 cigarettes a day at baseline; and (4) higher perceived confidence to quit (Adjusted OR per score=1.16, 95% CI=1.01-1.34). On the contrary, consuming 15-24 cigarettes a day at baseline was associated with lower abstinence, compared with those who smoked 5-14 cigarettes to quit at 6 months (Adjusted OR=0.57, 95% CI=0.34-0.98) (Table 2).

**Table 2 Predictors to quit smoking at 6-month follow-up by generalized estimating equation model (N=1,085)<sup>1</sup>**

Predictors to quit smoking	Adj. OR	p-value	95%CI
<b>Intervention</b>			
Control	1.00		
Counseling	1.03	0.94	0.47-2.29
SMS	0.76	0.62	0.25-2.28
<b>Gender</b>			
Female	1.00		
Male	0.87	0.59	0.52-1.45
<b>Age</b>			
	1.00	0.58	0.98-1.01
<b>Marital status</b>			
Single	1.00		
Married/Cohabited	1.82	0.01	1.15-2.86
Widowed/Divorced	3.89	<0.01	1.85-8.19
<b>Recent Experience of quitting</b>			
Never tried to quit	1.00		
Within past month	2.04	0.04	1.03-4.01
Within 6 months	1.72	0.04	1.03-2.85
Within this year	1.09	0.84	0.48-2.47
More than 1 year before	1.23	0.19	0.90-1.69
<b>Daily cigarette consumption</b>			
1 to 4 cigarettes	1.64	0.03	1.05-2.56
5 to 14 cigarettes	1.00		
15 to 24 cigarettes	0.57	0.04	0.34-0.98
25 cigarettes or above	0.89	0.76	0.41-1.91
<b>Perceived confidence of quitting</b>			
	1.16	0.03	1.01-1.34

Adj. OR = adjusted odds ratio; CI = confidence interval

<sup>1</sup> Excluding 31 incomplete responses

Participants who were lost to follow-up were treated as continued smoking status at 6 months, by intention-to-treat analysis

The following variables were insignificant and excluded in the model:

- (1) Education level;
- (2) Household income;
- (3) Years of smoking;
- (4) Age of starting smoking;
- (5) Perceived importance of quitting; and
- (6) Perceived difficulty of quitting

## 4. Discussion

The Quit to Win Contest 2012 recruited 1,193 smokers from mid-July to late-September 2012 in the 18 districts in Hong Kong, which was higher than 2009 (N=1,119) and 2010 (N=1,103). In summary, by ITT analysis, 10.6% and 9.5% of the participants quit smoking at 3 and 6 months, respectively. At 3 months, 47.0% of the participants reduced smoking (including quitters) by at least 50%,

and 55.4% had quit attempt. The corresponding figures at the 6-month follow-up were 50.9% and 58.3%, respectively. No significant difference in the self-reported quit rate among the 3 RCT groups was found. The Counseling group had a higher biochemically validated quit rate and rate of smoking reduction (including quitters) than the Control group, and the SMS group had a higher rate of quit attempt than the Control group.

One in ten participants of the Quit to Win Contest 2012 reported abstinence at 6 months, which was lower than the Contest in 2009 and 2010. The 6-month self-reported quit rate for the Quit to Win Contest 2009 and 2010 was 21.6% and 16.4%, respectively. Although fewer participants at the baseline in the 2012 Contest had heavy nicotine dependence (2009: 32.7%; 2010: 35.0%; 2012: 26.7%), fewer participants had previous quit attempts (2009: 70.1%; 2010: 68.8%; 2012: 62.9%) and intention to quit smoking within 7 days (2009: 67.0%; 2010: 66.8%; 2012: 52.6%). These findings are consistent with a recent local study which showed that the proportion of hardcore smokers, defined as having high nicotine dependence, no previous quit attempt and no intention to quit, has increased in Hong Kong in the recent decade, accompanied by the declining smoking prevalence<sup>8</sup>. Therefore, the increase in participants who were not ready to quit and had no quitting experience at the baseline among the three Contests could be a major reason for the declining quit rate. Another possible reason for the declining quit rate was the recruitment strategy in the 2012 Contest. In the 2012 Contest, 247 participants (22.2%) were recruited through “mobile recruitment”, which means that our recruitment staff walked through the specific public places and proactively asked the smoking passers-by to participate in the Contest. This recruitment method might recruit more smokers who had lower intention to quit than those who were recruited from the recruitment booths, thereby reducing the later abstinence. Nevertheless, with the participation of the non-government organizations, the 2012 Contest had promoted smoking cessation in the public but also might have recruited more unmotivated smokers than before and reduced the abstinence rate.

The findings suggested that the on-site counseling and the mobile phone messages did not boost up the quit rate. This finding was consistent with the previous RCTs of the Quit to Win Contest, which showed that the brief behavioral interventions could not increase abstinence significantly. Another explanation is the heterogeneity of smoking profiles among the three RCT groups. We found that the Control group at baseline had significantly lower daily cigarette consumption than the other groups, and more participants in the Control group were not ready to quit. The effectiveness of the additional intervention might be contaminated by the different baseline smoking profiles of the 3 RCT groups. The assumption of the cluster randomization that the smoking profiles of the participants recruited in different districts were similar might not be true. To increase comparability between the RCT groups, future RCTs for Quit to Win Contest should apply individual randomization if feasible.

However, the Counseling group had significantly higher rate of reducing smoking than the Control group, whereas the SMS group showed a significantly higher proportion of having quit attempts than the Control group. Also, both Counseling and SMS groups maintained the perceived importance to quit at 3- and 6-month follow-ups, whereas this indicator in the Control group dropped significantly. These findings supported that these brief interventions were beneficial for other smoking cessation outcomes and maintaining their motivation to quit. In addition to the intervention at the baseline, more counseling in the follow-up or extension of the intervention period might be needed to help smokers to quit and those who did not maintain long-term abstinence.

There was a decreasing trend of smokers who did not use any specific methods, from 91.8% in 2009, to 83.5% in 2010 and 63.7% in 2012. 15.5% of the participants in the present study reported that they used nicotine replacement therapy for quitting, compared with 5.5% in 2009 and 1.8% in 2010. As we did not provide any medication and counseling on the use of medication in the intervention, our finding suggests that smokers are becoming more likely to seek available and accessible methods to quit smoking, such as NRT. Future studies and Quit to Win Contest can explore the feasibility and effectiveness of providing pharmaceutical therapy for the smokers.

## 5. Conclusions

In conclusion, the Quit to Win Contest 2012 successfully promoted smoking cessation to a large group of smokers, as many of them had low intention to quit and were unlikely to seek help from smoking cessation services. The brief on-site counseling and messaging services could maintain participants' perceived importance

to quit and increase quit attempt and smoking reduction, but these additional interventions did not boost up the quit rate. In future, other interventions including more monetary incentives and pharmaceutical therapy can be provided to attract more smokers to quit.

## 6. Clinical trial Registration

Clinical trial registration number: NCT01670864 · (<http://www.controlled-trials.gov>)

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## 8. Acknowledgements

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## Appendix 1 Quit to Win 2012 - SMS Text Message for the SMS group

R = Ready to quit (intend to quit within the next 30 days);

NR = Not ready to quit (intend to quit after 30 days or more or has not decided to quit)

Classification	R	NR	Message
Welcoming message	✓	✓	歡迎你參加《戒煙大贏家》比賽！只要你於參賽後3個月內完全停止吸煙，就有機會贏取港幣一萬元超市現金券！
End of 1 <sup>st</sup> week message – gift redemption	✓	✓	恭喜你參加了《戒煙大贏家》比賽一個星期！為鼓勵你戒煙，請憑此短訊到報名機構換領神秘禮物！
Ending message & encouragement	✓	✓	我們會在未來三星期內繼續發放戒煙短訊。你可隨時發一個空白短訊到5109-6918終止這項服務。你可以上網 <a href="http://www.smokefree.hk">www.smokefree.hk</a> ，或下載「戒煙達人」app，知多點戒煙貼士！
Final message	✓	✓	加油！你已經參加了《戒煙大贏家》比賽一個月。隨時重溫戒煙短訊，成功戒煙有機會贏取港幣一萬元超市現金券！
5R: Risk #1	✓	✓	每兩個煙民，會有一個因食煙提早死亡。食煙成身煙味，皮膚都差D。越食越冇型。戒煙啦！
5R: Risk #2		✓	食煙會減低血液帶氧能力，越食體能越差。二手煙含有害物質，竊著你全身，影響身邊人。戒煙啦！
5R: Reward #1		✓	戒煙永遠唔會太遲！唔食煙可以立刻改變血液循環，同埋咳番積聚在氣管內的有害物出來。
5R: Reward #2		✓	計下戒煙慳到多少錢？如果平時每日食一包，唔食煙一個月已經可以慳千五元！
5R: Roadblocks (Decisional balance)		✓	有決心戒煙嗎？寫低吸煙的壞處，戒煙的好處，你就會知道點解要戒煙！
Myth and reality #1		✓	吸煙可以減壓？尼古丁七秒上腦，影響記憶力，工作表現也較差。戒煙啦！
Myth and reality #2		✓	吸「特醇」或「薄荷」煙只會令你越食越多煙。唯有戒煙才真正保障你及家人健康。
Set quit date	✓	✓	準備好戒煙嗎？立即定下戒煙日期，寫低戒煙原因，搵支持你戒煙的人！
Seek support to quit		✓	想戒煙？主動告訴身邊的親人及朋友啦。他們的支持及提醒可以防止你繼續吸煙。
Seek support to quit	✓		戒煙前，主動告訴身邊的親人及朋友啦。他們的支持及提醒可以防止你繼續吸煙。
Quitting tips #1	✓	✓	想避開吸煙的誘惑？拋棄所有吸煙用品，避免去多人吸煙的地方。避免飲酒。
Quitting tips #2	✓		煙癮最多只會停留十五分鐘。每次想吸煙時就盡量拖延，深呼吸放鬆自己，大量飲水減低煙癮。
Quitting tips #3	✓		如果屋企人食煙，叫佢地一齊戒，或唔好在家食煙！他們的支持及提醒可以防止你繼續吸煙。
Quitting tips #4	✓		隨身帶備無糖香口膠或薄荷糖。當有人請你食煙前放定一粒入口先，避免吸煙！
Nicotine dependence & medication	✓	✓	覺得自己上癮太深？可以嘗試去藥房尋求戒煙藥物協助，又或者打去1833-183問下！
Referral – Quitline 1833-183	✓	✓	戒煙有時並唔容易，但係你每嘗試戒煙多一次，成功戒煙的機會就多一次！立即致電衛生署戒煙熱線1833-183。
Withdrawal symptoms	✓		戒煙後身體不適？由於尼古丁上癮，停煙可能短暫令人煩躁、難以集中精神、失眠、抑鬱或體重增加，但會在兩星期內慢慢減退。
Encouragement	✓		隨住你戒煙日子增加，你煙癮發作的次數會減少。有一半吸煙者停煙7日後最終可以成功戒煙！
Relapse	✓		萬一唔小心食番煙？唔駛灰心，戒煙係一個過程。記住自己點解失敗，再接再厲！



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