Quit to Win 2010 –
Smoking Cessation Contest
June 2013, COSH Report No. 13

"Quit to Win 2010" and smoking cessation

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1. Introduction

The smoking cessation competition was originated in Minnesota from a heart health initiative during the 1980s in the USA. It encouraged smokers to quit smoking for prizes and monetary rewards. Since then, smoking cessation competition has been promoted in other states within the U.S. and other countries. Despite no firm conclusion drawn in Cochrane systematic review due to the small number of studies (only five) included and methodological flaws, quit to win contests at local and regional level appeared to increase quit rates from baseline community rates.[1] Surveys suggested that international Quit and Win contests may be effective. However, no firm conclusion has been drawn due to the lack of randomized controlled trial (RCT).[1]

In Hong Kong, under the 2006 Smoking (Public Health)(Amendment) Ordinance, the Government implemented a series of tobacco control measures, including the expansion of designated no smoking areas starting from 1 January 2007 and the implementation of the HK$1,500 fixed penalty for smoking offence from 1 September 2009. A big increase in tobacco tax was implemented in February 2009 after no increase for 8 years. The prevalence of daily smokers in the population aged 15 or above was 11.1% (676,900 smokers) in 2010. Of daily cigarette smokers, about 33% and 53% had tried but failed to give up smoking and had never tried but wanted to give up smoking, respectively, with the most common reasons including "not determined enough," "cigarette smoking had formed a habit/ favorite," and "most friends/colleagues were smokers."[2] These figures show that there is an urgency in promoting smoking cessation and it is important to study the characteristics of quitters and effectiveness of various cessation interventions.

Learning from the international smoking cessation competition, Hong Kong Council on Smoking and Health (COSH) and the University of Hong Kong launched Quit to Win Contest in order to attract and encourage smokers to quit smoking in the community and assess the effectiveness of minimal intervention on smoking cessation. In 2009, a 3-arm RCT tested the effectiveness of brief smoking cessation advice by telephone or SMS, by comparing to a control group, on quit rates and changes in smoking behaviors among smokers who joined the Quit to Win Contest.[3] A total of 1,119 participants were recruited from 31 recruitment activities in 14 (out of 18) districts within one and half month. Such strategies reached and attracted more smokers compared to 32 smoking cessation clinics from the Hospital Authority with only 2,854 smokers attended in 12 months. At 6-month follow-up, the self-reported quit rate reached 22%. However, no difference in the self-reported quit rate was found among the 3 RCT groups. This quit rate was higher than that of a local quitline (12%).[4]

In 2010, COSH launched Quit-to-Win Contest again to attract and encourage smokers to quit smoking. A 2-arm RCT was conducted to evaluate the effectiveness of a brief smoking cessation advice delivered by trained counselor onsite, comparing to a control group, on quit rates and changes in smoking behaviours and to analyse psychological factors related to smoking. Successful quitters were eligible to join the lucky draw, as in the 2009 contest.

2. Methods

2.1 Recruitment

COSH conducted 31 recruitment activities in shopping malls and public areas in 14 (out of 18) districts in Hong Kong from mid-June to late August 2010 to promote this campaign and recruit participants. Smokers were invited to visit the booths and join the contest. Trained research assistants (RAs) screened participants with the following eligibility criteria for the Contest and the RCT:

1. Hong Kong residents aged 18 or above;
2. Daily smokers who smoked at least 1 cigarette per day in the past 6 months;
3. Exhaled carbon monoxide (CO) of 4 ppm or above; and
4. Able to communicate in Cantonese and read Chinese.

Smokers who were psychologically or physically unable to communicate, or currently following other smoking cessation programmes were excluded from this RCT.

After obtaining written consent from the participants, the RAs administered the baseline questionnaire, measured the exhaled carbon monoxide (CO) level, distributed self-help smoking cessation booklets to the participants and assigned a unique participation number. Participants who were unwilling to join the RCT could join the Quit to Win Contest, but they were assigned to the Non-RCT group.

Cluster randomization was used to allocate the first 20 recruitment sessions into one of the two RCT groups. Ten sessions were allocated to the intervention group and other 10 to the control group through a random-digit generator from the website (http://www.random.org). Participants in the intervention group were given a brief on-site smoking cessation advice, and the control group received no on-site advice. Eleven additional sessions were organized with the remaining resources from the first 20 recruitment sessions. Participants who were eligible and consented to participate in the Contest in these 11 sessions were assigned to the non-RCT group.

2.2 Intervention and Follow-up

Intervention Group - Participants in the intervention group received a brief (5 minutes) smoking cessation advice provided by trained smoking cessation counselors onsite. They received advice on quitting smoking and specific warning on the hazardous effects of smoking on health using the AWARD approach: (1) Ask the smoking history, (2) Warn about the high risk (e.g., half of the smokers will die of smoking-related diseases), (3) Advise to quit, (4) Refer the smokers to professionals, and (5) Do-it-again, by repeating the interventions and support. Hotline numbers were given to the participants if they needed further help. They also received the COSH self-help smoking cessation 8-page booklet, which included information on the advantages to quit smoking, tips on smoking cessations, self-test on nicotine dependence, and contact information of smoking cessation services, at the recruitment sites.

Control Group and Non-RCT Group – Participants in the control group did not receive any quitting assistance other than the same COSH self-help smoking cessation booklet at the recruitment sites.

All participants were followed up at 6-month after baseline recruitment. Trained student interviewers, 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 periods, to reach each participant. Those who failed to be contacted in all attempts were classified as lost 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 (CO) and salivary cotinine levels. The standard for validated abstinence was that exhaled CO level < 4 ppm and saliva cotinine < 10ng/ml. Participants who passed the biochemical validation were offered the opportunity to enter into a lucky draw organized by COSH. The primary outcome was self-reported 7-day point prevalence quit rate at 6-month follow-up, and secondary outcomes were biochemically validated quit rate, rate of smoking reduction by at least 50%, and number of quit attempts.

A total of 13 participants who stopped smoking at 6-month follow-up and passed the bio-chemical validations won the lucky draw prizes: 3 of them each received a HK$10,000 gift voucher and 10 of them each received a HK$4,000 gift voucher. Another 3 awards (3 HK$3,000 gift vouchers) were granted to three persons who nominated smokers to join the Quit to Win Contest, and the nominated smokers quitted successfully at 6-month follow-up.

The baseline characteristics of all subjects (N=1103) were described together. For the RCT, the main comparison would be the quit rates, smoking profiles and psychosocial factors at six months between intervention and control group.

We adopted the intention-to-treat (ITT) analysis (assuming participants who lost to follow up did not change their baseline smoking behavior) to estimate various cessation outcomes. We also performed complete case analysis (by excluding all partipants who lost to follow up) because the lost-to-follow-up rate in the intervention group was substantially greater than that in the control group (30.2% vs 25.4%).

3. Results

In all the 31 recruitment sessions, a total of 1,139 participants visited the smoking cessation booths and received the smoking cessation self-help booklets, and 1,103 (96.8%) of them were eligible and consented to participate in the Contest. Of the 1,103, 831 recruited at the 20 randomized sessions participated in the RCT (Intervention: N=441; Control: N=390). The other 272 participants from the 11 latter sessions were allocated to the non-RCT group.

Baseline results

3.1 Demographic characteristics of all participants

Table 1 shows that most (83.8%) of the 1,103 participants were male, nearly two-third (63.9%) aged 40 or above, and 73.1% were married. Slightly over half of participants (54.2%) had some education up to Form 3 and 33.6% had attained Form 4-7. Nearly two-third (65.0%) were employed and most (76.6%) had monthly household income < HK$20,000. For 847 who were married or single but with children, 55.8% had more than one child. The socio-economic profiles were similar among the 2 RCT groups (p-values > 0.05).

Table 1 Baseline demographic characteristics of all participants

		All participants (N=1103) N (%)	Non- RCT group (N= 272) N (%)	Intervention[2] (N = 441) N (%)	Control[2] (N = 390) N (%)
Gender	Male	924 (83.8)	227 (83.4)	376 (85.3)	321 (82.3)
	Female	179 (16.2)	45 (16.5)	65 (14.7)	69 (17.7)
		M (SD)			
Age[1], years		45.91 (15.0)	42.65 (15.1)	47.40 (15.2)	46.45 (14.3)
		N (%)			
Age group[1], years	18-29	161 (14.7)	59 (23.9)	60 (13.6)	42 (10.8)
	30-39	237 (21.6)	64 (25.9)	84 (19.1)	89 (22.9)
	40-49	263 (24.0)	58 (23.5)	99 (22.4)	106 (27.2)
	50-59	211 (19.3)	52 (21.1)	92 (20.9)	67 (17.2)
	60 or over	224 (20.4)	14 (5.7)	105 (23.9)	85 (21.9)
Marital status[1]	Single	263 (23.8)	82 (30.1)	98 (22.2)	83 (21.3)
	Married/Cohabit	806 (73.1)	183 (67.3)	330 (74.8)	293 (75.1)
	Other	34 (3.1)	7 (2.6)	13 (2.9)	14 (3.6)
		N=874	N=192	N=346	N=309
Child[3]	None	100 (11.8)	34 (17.7)	37 (10.7)	29 (9.4)
	One child	274 (32.3)	54 (28.1)	111 (32.1)	109 (35.3)
	Two children	272 (32.1)	63 (32.8)	113 (32.7)	96 (31.1)
	Three or more children	201 (23.7)	41 (21.4)	85 (24.6)	75 (24.3)
		N=1103	N=272	N=441	N=390
Education level[1]	No formal education	37 (3.4)	5 (1.8)	17 (3.9)	15 (3.8)
	Primary School to F3	560 (50.9)	108 (39.7)	243 (55.4)	209 (53.6)
	F4 – F7	370 (33.6)	108 (39.7)	139 (31.7)	123 (31.5)
	Post-secondary or above	134 (12.2)	51 (18.8)	40 (9.1)	43 (11.0)
Work status[1]	Student	17 (1.6)	2 (0.7)	9 (2.0)	6 (1.5)
	Self-employed/Employed	710 (65.0)	203 (74.9)	269 (61.0)	238 (61.0)
	Unemployed	110 (10.1)	20 (7.4)	43 (9.8)	47 (12.1)
	Housewife	64 (5.9)	11 (4.1)	28 (6.3)	25 (6.4)
	Retired	201 (18.4)	35 (12.9)	92 (20.9)	74 (19.0)
Monthly household income[1]	Less than $10,000	450 (40.8)	87 (32.1)	208 (47.2)	155 (39.7)
	$10,000- $19,999	395 (35.8)	98 (36.2)	144 (32.7)	153 (39.2)
	$20,000- $29,999	148 (13.4)	50 (18.5)	49 (11.1)	49 (12.6)
	$30000 or more	109 (9.9)	36 (13.3)	40 (9.1)	33 (8.5)

[1] Missing data was excluded
[2] Statistical comparisons were performed between the two study groups (Intervention and Control) in the RCT study but no significant difference was found between groups.
[3] Participants who were single and without children were excluded

3.2 Smoking profile

In both intervention and control groups, the majority (69.4% and 71.5%, respectively) started smoking before the age of 20 years (Figure 1). About half of the participants in the intervention group smoked 11-20 cigarettes a day (47.8%), and 10.4% smoked more than 20 cigarettes a day (Figure 2). The corresponding figures for the control group were 45.9% and 13.1%. While about 70% had ever attempted to quit smoking in both intervention and control groups (smoking abstinence for over 24 hours), only 19% and 23.1% had quit attempts in the past 12 months in the intervention and control groups, respectively (Figure 3). These smoking and quitting profiles were similar among the 2 RCT groups (p-values > 0.05).

Figure 1

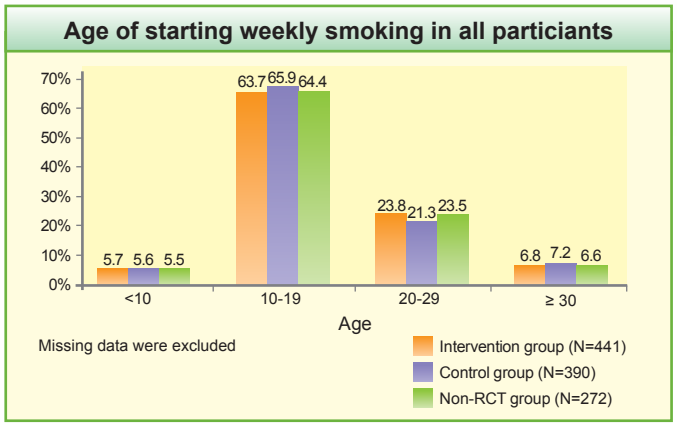


Figure 2

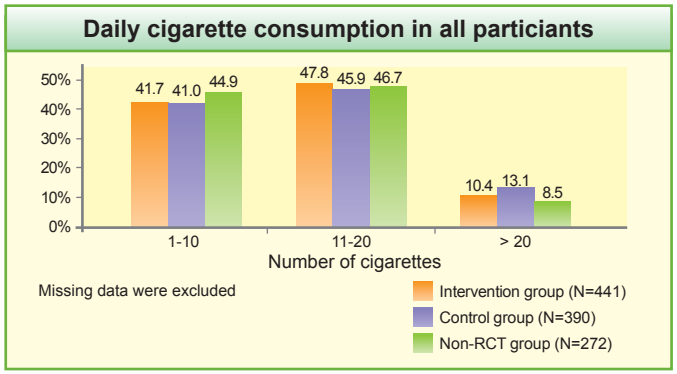
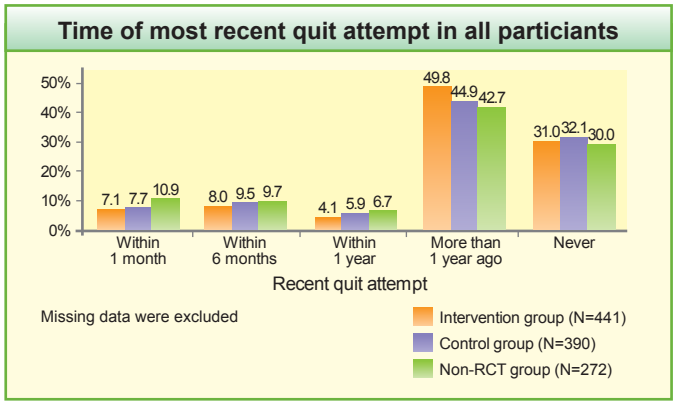


Figure 3



3.3 Environmental influence

At baseline, the most common source of support for all participants to quit smoking included: (1) spouse (58.9%, 650/1103), (2) children (52.5%, 579/1103), and (3) parents (18.8%, 207/1103). However, 12.8% (141/1103) perceived no support in their quitting process. Fewer participants in the intervention group than the control group received support from their parents (13.4% vs. 19.7%, p<0.05; table not shown). No other differences were found between the 2 RCT groups (p>0.05).

About 30% of participants in the intervention and control group (30.8% and 29%, respectively) lived with one or more smoking family members (Figure 4). About 80% (81.6% and 81%, correspondingly) reported that half or more of their friends smoked cigarettes (Figure 5), and about 50% (55% and 51.8%, correspondingly) reported that half or more of their colleagues smoked cigarettes (Figure 6). These differences among the 2 RCT groups were not statistically significant (p-values > 0.05).

Figure 4

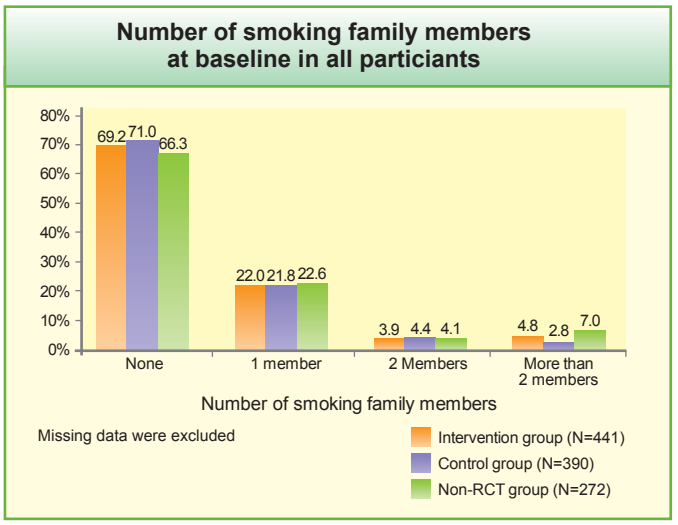


Figure 5

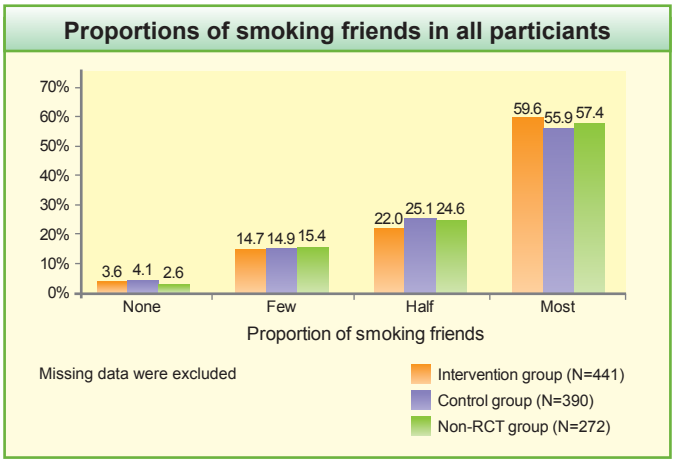
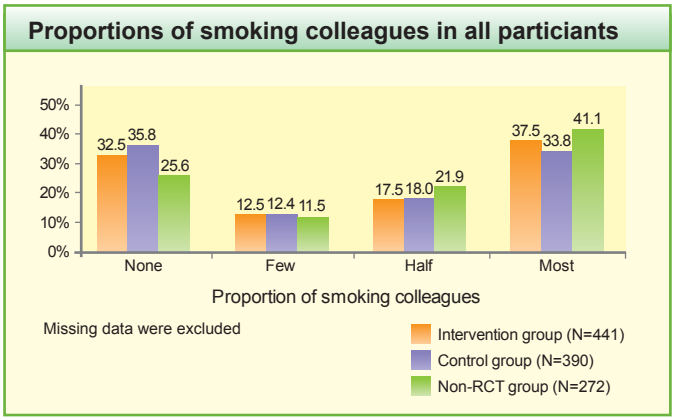


Figure 6



Six-month follow-up results

3.4 Retention rate

At the 6-month follow up, the overall retention rate was 74.1% (787/1103), with 69.8% (308/441) in the intervention group and 74.6% (291/390) for the control group (p = 0.15).

3.5 Quit rate & rate of smoking reduction by half or more

Overall, by ITT, the self-reported quit rate (7-day point prevalence) of participants in intervention, control, and non-RCT groups at 6-month follow-up was 18.4% (81/441), 13.8% (54/390) and 16.9% (46/272), respectively. The intervention group seemed to show a greater quit rate than the control group but the difference was marginally significant (p=0.078) (Figure 7). In complete case comparison, the self-reported quit rate of participants in the intervention, control, and non-RCT groups at 6-month follow-up was 26.3% (81/308), 18.6% (54/291), and 24.5% (46/188), respectively. The self-reported quit rate was significantly greater in the intervention than control group (p=0.015) (Figure 8). These results suggested that the intervention had a 33% (18.4%/13.8%) to 41% (26.3%/18.6%) higher rate of success in quitting than the control group, which was a small effect size.

Figure 7

Quit rates, rates of smoking reduction and quit attempt at 6-month follow-up, by intention-to-treat analysis [1]

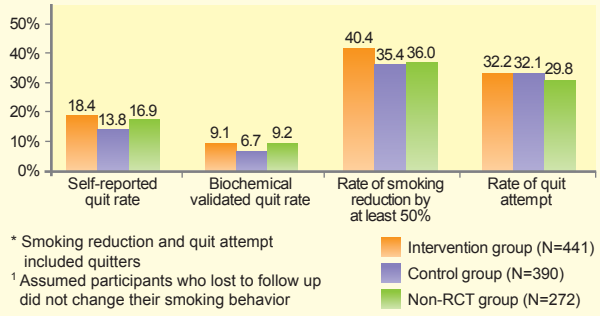
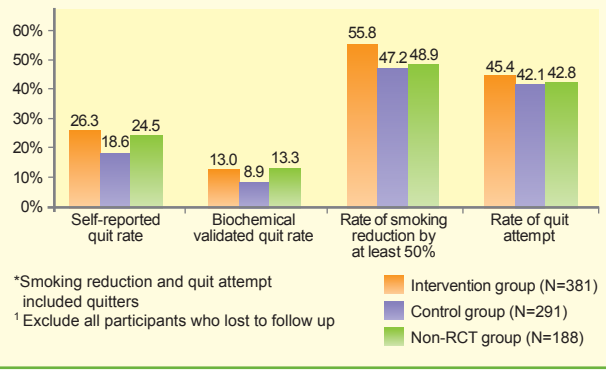


Figure 8

Quit rates, rates of smoking reduction and quit attempt at 6-month follow-up, by complete case analysis [1]



At 6-month follow-up, by ITT, the validated quit rate was 9.1% (40/441) and 6.7% (26/390) in the intervention and control groups, respectively (p=0.20). The validated quit rates were lower than the self-reported quit rates, as overall, 54.8% (74/135) of self-reported quitters participated in the validation, and among these participants, 89.2% (66/74) passed. In the intervention group, among 81 self-reported quitters, 55.6% (45/81) participated in the validation, and among these participants, 88.9% (40/45) passed. The corresponding figures for the control group were 53.7% (29/54) and 89.7% (26/29). There was no significant difference in the rate of passing the validation between the intervention and control groups (88.9% (40/45) vs 89.7% (26/29); p=0.61). In complete case comparison, the validated quit rate at 6-month follow-up was 13% (40/308) in the intervention group, which was greater than that in the control group but marginally not significant (8.9% (26/291) p=0.11) (Figure 8).

When we included participants who had quitted smoking, the overall smoking reduction rate (reduced cigarette consumption by at least 50% compared to baseline) at 6-month follow-up was 40.4% and 35.4%, respectively, in the intervention and control group (p=0.14)(Figure 7). In complete case comparison, the smoking reduction rate was 55.8% and 47.2%, respectively, in the intervention and control group and the difference was significant (p=0.02)(Figure 8).

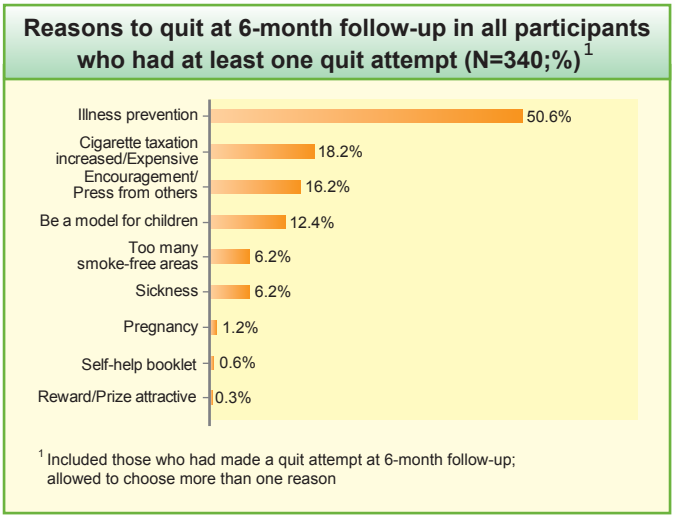
By ITT, when we excluded those who quitted smoking at the follow-up, the smoking reduction rate at 6-month follow-up was 32.2% and 32.1% in the intervention and control group, respectively. The reduction rates excluding quitters were also similar between the 2 RCT groups (p-values = 0.55). The corresponding figures for complete case comparison were 42.7% and 35.9%, which was of marginal statistical significance (p=0.08) .

3.6 Reasons of quit attempts, methods and relapse

At 6-month follow-up, overall, among 340 participants who had made at least one quit attempt (N=138, 122, and 80 in the intervention, control, and non-RCT groups, respectively), the five most common reasons for participants to initiate a quit attempt were: (1) illness prevention (50.6%=172/340), (2) increased cigarette taxation or expensive (18.2%=62/340), (3) received encouragement or pressure from others to quit smoking (16.2%= 55/340), (4) being a role model for children (12.4%=42/340), (5) too many smoke-free areas (6.2%=21/340) (Figure 9). More participants in the intervention group made a quit attempt due to sickness (11.6% vs. 0.8%, p<0.001) whereas fewer participants in the intervention group made a quit attempt due to

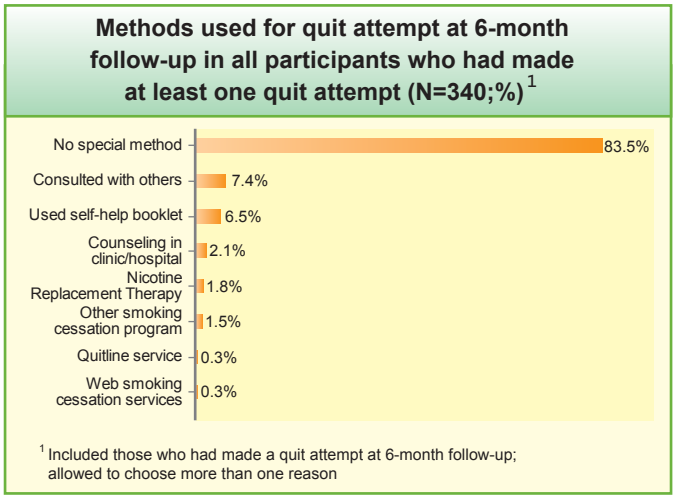
increase in cigarette taxation/ expensive cigarette price (13% vs. 25.4%, p<0.001) comparing to the control group.

Figure 9



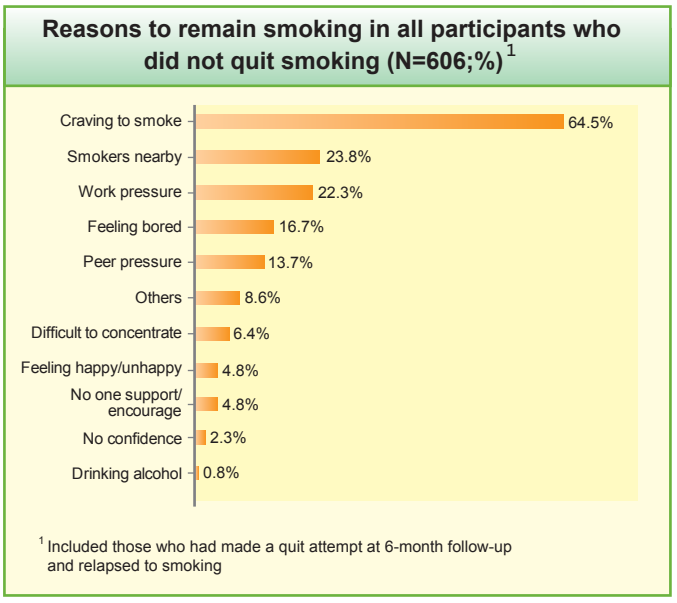
Most of the 340 participants (N=138, 122, and 80 in the intervention, control, and non-RCT groups, respectively) who had made a quit attempt (83.5%) did not use any specific method to quit smoking, while some consulted others (7.4%) and used the self-help booklet (6.5%) during the quit attempt (Figure 10). Fewer participants in the intervention group than in the control group used the self-help booklet (2.2% vs. 8.2%; p<0.05).

Figure 10



Among 606 who did not quit at 6-month follow-up (N=227, 237, 142 in the intervention, control, and non-RCT groups, respectively), the most common reasons of continuing smoking were (1) craving to smoke (64.5%), (2) smokers nearby (23.8%), (3) work pressure (22.3%), and (4) feeling bored (16.7%) (Figure 11). The pattern was similar among the 2 RCT groups (p-values > 0.05)

Figure 11



3.7 Social support during smoking cessation

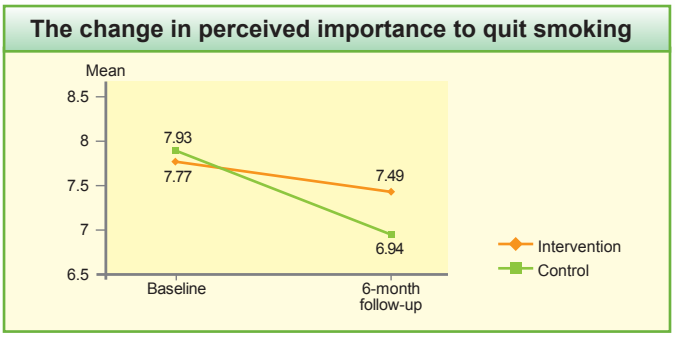
At 6-month follow-up, among 787 participants who completed the follow-up questionnaire (N=308, 291, 188 in the intervention, control, and non-RCT group, respectively), the major source of support to quit came from the spouse (42.3%), children (28.5%), friends (15.6%) and parents (13.1%). On the other hand, 29.4% responded they received no social support during the quitting process. The pattern was similar between the 2 RCT groups (p > 0.05).

3.8 Psycho-social factors (importance, confidence, and difficulty) related to quit smoking

In a scale of 0 (minimum) to 10 (maximum), the mean scores of "perceived level of importance of quitting smoking" at baseline was 7.93 (SD=0.14) and 7.77(SD=0.14) in the intervention and control group, respectively (Figure 12). Corresponding mean scores for "perceived level of difficulty of quit smoking" and "perceived level of confidence to quit smoking" at baseline were 7.15(SD=0.16) and 6.89 (SD=0.16) (Figure 13), and 5.81 (SD=0.15) and 5.88 (SD=0.15) (Figure 14). All these baseline psycho-social factors were similar among the 2 RCT groups (p-values > 0.05).

The mean score of perceived importance at baseline was similar in intervention and control groups (p=0.17) (Figure 12). The effectiveness of the intervention on the psycho-social factors was assessed by comparing the percentage change of mean scores from baseline to 6-month follow-up among the 2 RCT groups (i.e. T_{FU}-$T_{baseline}$/$T_{baseline}$). At 6-month follow-up, a greater decrease in perceived importance of quitting was observed in the control (12.5%) than intervention groups (5.5%) (p=0.004), and the score was significantly higher in the intervention than control group (Mean (SD) = 7.49 (0.14) vs. 6.94 (0.14), p<0.01) (Figure 12).

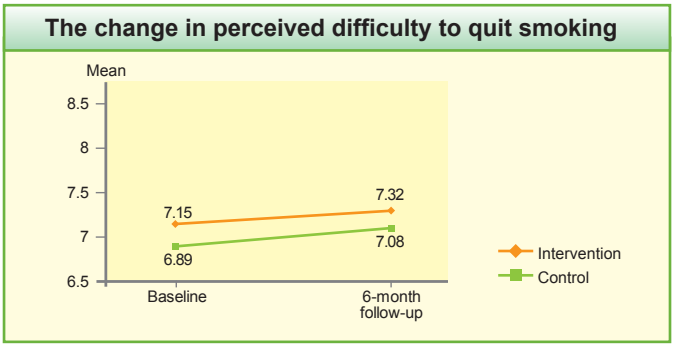
Figure 12



Within-group pair-sample t-test (pre vs. post):
Intervention group: p=0.10
Control group: p<0.01
Between-group independent t-test:
Baseline: p=0.17
6-month: p<0.01
Interaction between time and group: p=0.004

For the perceived difficulty to quit, the changes between baseline and 6-month follow-up were similar and less than three percent in both intervention (2.8%) and control groups (2.4%) (p=0.94) (Figure 13). The scores were also similar among the two RCT groups, at both baseline and follow-up (p-values > 0.05).

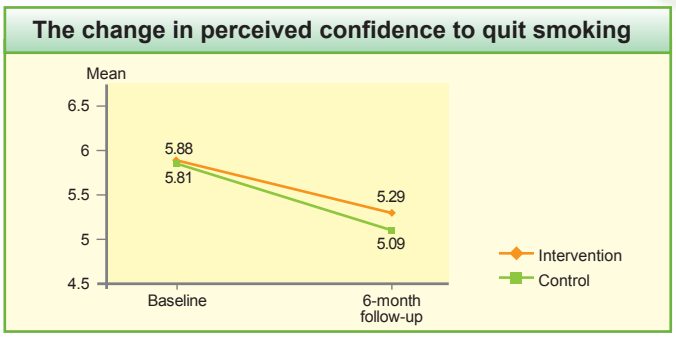
Figure 13



Within-group pair-sample t-test (pre vs. post):
Intervention group: p=0.29
Control group: p=0.31
Between-group independent t-test:
Baseline: p=0.20
6-month: p=0.19
Interaction between time and group: p=0.94

The mean scores of perceived confidence were similar between the two RCT groups, at both baseline and 6-month follow-up (p-values > 0.05) (Figure 14). The decrease between baseline and follow-up were also similar in both intervention (10%) and control groups (12.4%) (p=0.62).

Figure 14



Within-group pair-sample t-test (pre vs. post):
Intervention group: p<0.01
Control group: p<0.01
Between-group independent t-test:
Baseline: p=0.18
6-month: p=0.22
Interaction between time and group: p=0.62

3.9 Predictors on quitting at 6-month follow-up

In intention to treat analysis, using the generalized estimating equations (GEE) models on the 817 participants, the likelihood to quit smoking was higher among those who: (1) aged≥50 years, and (2) had higher education attainment. Smokers who (3) smoked 10 cigarettes or less daily, (4) started smoking at the age of 18 or older, (5) prepared to quit, (6) attempted to quit previously, and (7) perceived higher level of confidence to quit smoking were more likely to quit smoking at 6-month follow-up. The brief on-site counseling increased the likelihood of quit smoking at 6-month follow-up but not statistically significant (Adj. OR=1.46; 95%CI=0.86-2.49).

Table 2 Predictors of quit smoking at six-month follow-up using GEE and intention to treat (N=817)

Quitting (Intention to treat; N=817[1])	Adj. OR[2]	p-value	95% CI
Intervention	1.46	0.16	0.86 - 2.49
Aged ≥ 50 years	1.85	0.003	1.23 - 2.78
Gender (Ref: Male)	1.21	0.32	0.83 - 1.76
Educational attainment			
Tertiary or above	2.67	<0.001	1.66 - 4.31
Secondary school	1.56	0.03	1.04 - 2.35
Primary school/kindergarten	1	-	-
Daily cigarette consumption			
1 to 10 cigarettes	4.04	0.004	1.57 - 10.35
11 to 20 cigarettes	1.65	0.25	0.70 - 3.87
Over 20 cigarettes	1	-	-
Started smoking ≥ 18 years old	1.40	0.08	0.96 - 2.04
Stage of readiness to quit at baseline			
Preparation stage	2.01	0.04	1.01 - 3.98
Contemplation stage	1.26	0.52	0.61 - 2.60
Pre-contemplation stage	1	-	-
Previous quit attempt (Ref: No)	1.60	0.02	1.06 - 2.40
Perceived level of confidence in quitting at baseline (0 – 10)	1.19	<0.001	1.09 - 1.30

Notes: Adj. OR = adjusted odds-ratio; CI = confidence interval;
[1] Excluded 14 incomplete baseline data
[2] Adjusted for all other variables in the model; accounted for the cluster randomized design.
The following variables were insignificant in crude models and excluded in the model:
(1) perceived importance of, and difficulty in quitting;
(2) social norm in smoking (presence of smoking household members, proportion of smoking friends and colleagues, awareness of anti-smoking campaigns, and support received to quit smoking); and
(3) other demographic characteristics (having children, living district, and monthly household income).

In complete case analysis, the likelihood of quit smoking were higher among those who (1) aged 50 years or older, (2) had higher education attainment, (3) smoked 10 cigarettes or less daily, (4) started smoking at the age of 18 or older, (5) prepared to quit, (6) perceived higher level of confidence and (7) lower level difficulty to quit. The brief on-site counseling increased the likelihood of quit smoking at 6-month follow-up but not statistically significant (Adj. OR=1.56; 95%CI=0.92-2.65).

Table 3 Predictors of quit smoking at six-month follow-up using GEE and complete case analysis (N=586)

Quitting (complete case analysis; N=586[1])	Adj. OR[2]	p-value	95% CI
Intervention	1.56	0.10	0.92 - 2.65
Aged ≥ 50 years	1.83	0.03	1.07 - 3.13
Gender (Ref: Male)	1.14	0.53	0.75 - 1.75
Educational attainment			
Tertiary or above	2.66	0.002	1.45 - 4.86
Secondary school	1.78	0.03	1.06 - 3.00
Primary school/kindergarten	1	-	-
Daily cigarette consumption			
1 to 10 cigarettes	4.08	0.004	1.57 - 10.60
11 to 20 cigarettes	1.55	0.31	0.66 - 3.62
Over 20 cigarettes	1	-	-
Started smoking ≥ 18 years old	1.48	0.04	1.03 - 2.14
Stage of readiness to quit at baseline			
Preparation stage	2.10	0.06	0.98 - 4.50
Contemplation stage	1.40	0.39	0.65 - 3.01
Pre-contemplation stage	1	-	-
Previous quit attempt (Ref: No)	1.39	0.10	0.93 - 2.08
Proportion of smoking colleagues (Ref: Half or less)	0.70	0.13	0.44 - 1.11
Perceived level of confidence to quit at baseline (0 – 10)	1.23	<0.001	1.12 - 1.35
Perceived level of difficulty to quit at baseline (0 – 10)	0.95	0.07	0.89 - 1.01

Notes: Adj. OR = adjusted odds-ratio; CI = confidence interval;
[1] Excluded 245 incomplete data of which 232 were loss-to-follow up (i.e., no quitting data)
[2] Adjusted for all other variables in the model; accounted for the cluster randomized design.
The following variables were insignificant in crude models and excluded in the model:
(1) perceived importance of quitting;
(2) social norm in smoking (presence of smoking household members, proportion of smoking friends, awareness of anti-smoking campaigns, and support received to quit smoking); and
(3) other demographic characteristics (having children, living district, and monthly household income).

4. Discussion

In general, the Quit to Win Contest successfully promoted smoking cessation in the community. By setting up 31 recruitment activities in shopping malls or public areas in 14 out of 18 districts in Hong Kong, over 1,000 smokers joined the Contest within one and half months (from 19 June to 26 August 2010) .In comparison, 4,156 smokers attended and received baseline counseling among 32 smoking cessation clinics from the Hospital Authority in the entire year (12 months) in 2010.[5] Furthermore, the Contest attracted the difficult-to-reach groups of smokers in the community (older in age and lower socio-economic status), who were less likely to seek help in smoking cessation.[2] Compared with the Hong Kong smoking population[2] and smokers who attended smoking cessation clinic,[4] the Contest attracted smokers who were more likely to be currently unemployed, started smoking at a younger age, and had heavier smoking. By using financial incentives, the Quit to Win Contest provided a good platform to motivate community smokers who do not seek existing cessation services to quit smoking.

As the key outcome of the Contest, among all participants, the self-reported quit rate and biochemically validated at 6-month follow-up reached 16.4% and 8.3%, respectively, (by intention to treat analysis) and were comparable to international Quit & Win contests as reported in a recent systematic review.[1] However, the overall self-reported quit rate in 2009 Quit to Win Contest was 22%, which was significantly higher than the current figure ($z=3.13$, $p<0.01$). The decline of quit rate may be explained by the phenomenon that the remaining smokers have increasing difficulties to quit smoking or greater reluctance to quit, after more than 30 years of increasingly stringent tobacco control measures in Hong Kong.

By ITT, the self-reported quit rates in the intervention and control group at 6-month follow-up were 18% and 14%, respectively. In comparison, the corresponding figures in 2009 Quit to Win Contest were 21%, 22% and 20% for the two intervention groups of SMS advice and brief telephone counseling and the control group. In 2010, the crude risk ratio (intervention quit rate/control quit rate) and risk difference (intervention quit rate-control quit rate) of quitting for the intervention versus control group was 1.33 (95% CI= 0.94-1.88) and 0.046 (95% CI=-0.01-0.10), respectively, compared to the corresponding figures of 1.09 (95%CI=0.79-1.52) and 0.019 (95%CI=-0.04-0.08) for telephone counseling (versus control), and 1.01 (95%CI=0.72-1.42) and 0.003 (95%CI=-0.06-0.06) for SMS advice (versus. control) in 2009. The complete case analysis of the present intervention also showed a significant crude risk ratio of 1.41 (95% CI=1.00-1.99). These findings suggested that the brief face-to-face onsite counseling was an effective and

possibly more effective intervention to help smokers to quit smoking compared to controls, and to telephone counseling and SMS advice. Also, the findings support that the time of participation in a contest is likely to be a more "teachable moment" to provide cessation advice than a telephone follow-up later. However, by ITT, which was a conservative method of analysis, no significant differences in the quit rate, rate of smoking reduction and rate of quit attempts were found between the intervention and control group. The GEE models also observed positive but not statistically significant association between intervention and quit smoking (p=0.16 for ITT and 0.10 for complete case analysis). Subjects in the intervention group were 46% (intention to treat analysis) to 56% (complete case analysis) more likely to quit smoking but not statistically significant. The failure to show statistical significant was the most likely due to the lack of statistical power, as the sample size was limited by resources and other constraints. Hence, a much larger sample is needed for future RCTs. Also, a brief onsite counseling, as expected, could only have a small effect size.

Participants in the intervention group retained their level of perceived importance to quit smoking at 6-month follow-up, while the perceived importance of quitting decreased significantly in the control group (Figure 12). The present additional brief onsite counseling was also effective to maintain the perceived importance of quitting.

The other factors found to predict successful quitting included age of 50 years or older, higher education attainment, smoking 10 cigarettes or less daily, starting smoking at the age of 18 or older, preparing to quit, having previous attempts to quit, perceiving higher level of confidence but lower level of difficulty to quit.

5. Conclusions

To conclude, the Quit to Win Contest successfully reached a large number of smokers in the community who were otherwise unlikely to receive smoking cessation counseling through other means, with satisfactory outcomes in quitting or reducing smoking. The Contest has provided a positive environment to motivate smokers to quit. The RCT showed some evidence of small benefits from the brief onsite smoking cessation counseling on quitting and reduction and on perceived importance to quit smoking.

6. Recommendations

This kind of cessation contest is recommended to be conducted on a regular basis preferably as an annual event to provide an alternative platform to attract smokers in the community who may not want to seek help in smoking cessation clinics. It can also provide opportunities for RCTs to test the effectiveness of different additional interventions. Follow-up interventions on smokers who have failed to quit or relapsed, for example by referring to existing smoking cessation services, may be considered to increase the quit rate but whether these smokers would accept further follow up interviews and seek help from more intensive services is uncertain, and deserve further investigation.

7. Clinical trial Registration

Clinical trial registration number: (ISRCTN73730513, http://www.controlled-trials.com)

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9. Acknowledgements

We thank the student helpers, research assistants and smoking cessation counselors for recruitment of smokers, follow-up supports, data entry and statistical analysis. We are grateful to COSH for funding and excellent support from COSH staff. Finally, we thank the smokers and quitters who joined the Contest and provided useful information for this study.

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First Edition, 2013