

## The 6<sup>th</sup> “Quit to Win” Contest – Effectiveness of Active Referral Intervention on Smoking Cessation

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### 1. Introduction

Smoking prevalence in Hong Kong was 10.5% in 2015, which is one of the lowest in the world. However, there were still 641,300 daily smokers and the smoking prevalence has been decreasing slowly in the past decade. Most of the current smokers are heavy smokers with low intention to quit and have high dependence on tobacco. Smoking will kill half of them eventually<sup>2</sup> and causes about 7,000 deaths each year in Hong Kong<sup>3</sup>. Smoking also accounts for a large amount of medical costs, long-term healthcare costs and productivity loss of over HK\$5.3 billion a year (0.6% of Hong Kong GDP)<sup>4,5</sup>. Smoking is a highly addictive behaviour and it is hard for smokers with strong nicotine dependence to quit without assistance. However, in Hong Kong, only about 3.0% of the current smokers had ever used the existing smoking cessation (SC) services<sup>1</sup>.

The “Quit to Win” (QTW) Contest is a major campaign to promote smoking cessation in all 18 districts and motivate a large number of smokers in the community to quit in Hong Kong. It provides a golden opportunity to conduct a randomized controlled trial (RCT) to test different brief and low cost SC interventions so as to generate new evidence for future evidence-based interventions to reach, recruit and help a large number of smokers to quit. With the participation from the 18 districts, the campaign also strengthens the dissemination of smoke-free messages and community supports to SC.

Cohrane’s Quit and Win model posits that smokers participating in the contest will have a higher motivation to quit with incentives provided and better social support<sup>6</sup>.

Studies found that quitting contests or incentive programmes had reached many smokers and showed a significantly higher quit rate for the Quit and Win group than the control group<sup>7</sup>. Since 2009 (except 2011), Hong Kong Council on Smoking and Health (COSH) has been collaborating with the Schools of Nursing and Public Health of The University of Hong Kong (HKU), to organize the “Quit to Win” Contest. From 2009 to 2014, over 5,000 smokers were recruited from the community<sup>8-12</sup>. Small cash incentives and lucky draw prizes were provided to participants whose abstinence was biochemically validated.

SC services substantially increased quit rate and the WHO has urged to promote SC services<sup>13</sup>. “O” of the WHO MPOWER strategies stands for “offer help to quit” which suggests a proactive approach<sup>13</sup> to encourage smokers to quit. SC services in Hong Kong, like most SC services in mainland China and elsewhere, were under-used. Apart from the low prevalence of SC services used, most smokers (65%) were unwilling to try the services even they were aware of them<sup>1</sup>. Existing SC services mostly relied on smokers’ initiative to seek assistance for quitting, but the intention to quit was low in most smokers. Active referral may overcome the barriers of some smokers in actively seeking for help. Previous studies suggested that active referral of smokers to SC hotline services might increase the likelihood of smoking abstinence at 12 months compared with no active referrals<sup>14</sup>. A recent study has also reported that individuals who used the community-based referral were also more likely to quit than those who did not (43.6% versus 15.3%,  $p < 0.001$ )<sup>15</sup>.

In 2015, COSH, HKU, 18 District Councils and 15 district working partners collaborated to organize the 6<sup>th</sup> "Quit to Win" Contest to promote SC in the community. A 3-armed RCT was conducted to evaluate the effectiveness of the active referral to existing SC services including the SC Hotline (1833 183) and other SC services (Active Referral group), or brief advice (Brief Advice group), compared to a self-help booklet with general SC advice (Control group).

## 2. Methods

### 2.1 Recruitment

From 20 June to 24 September 2015, participants were recruited from 70 recruitment sessions of the QTW Contest, including promotional and game booths in public areas or shopping malls, throughout 18 districts in Hong Kong. Sixty-six recruitment sessions were included in the cluster RCT with each recruitment session was a unit of cluster of randomization (22 recruitment sessions for each intervention group). All participants in a recruitment session were randomly allocated to the Active Referral group, Brief Advice group or Control group.

In all the recruitment sessions, the trained SC ambassadors measured smokers' level of exhaled carbon monoxide (CO) and screened participants' 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 (including reading Chinese); and
4. Exhaled carbon monoxide (CO) of 4 parts per million (ppm) or above.

The SC ambassadors then explained and invited smokers to join the RCT. Written consents from eligible participants for voluntary participation in the trial were obtained. The baseline questionnaire was subsequently administered following with the delivery of the intervention. Eligible participants who were unwilling to join the RCT could still join the QTW Contest, but were excluded from the RCT analysis (Non-trial group).

Block randomization was used to ensure the number of recruitment sessions for the 3 RCT groups was balanced. The primary investigator, who was not involved in the recruitment, randomly generated blocks, with each block size equaled to 3, 6 and 9 containing random permutations of the 3 groups using the website <http://www.random.org> (a website for generating random integers). The primary investigator combined all the blocks and generated a list of group allocation for all recruitment sessions. The recruitment staff was informed about the group allocation one day prior to the recruitment

activities. The trained SC ambassadors were unknown about the group assignment until they attended the recruitment. All outcome assessors were blinded to the group assignment.

COSH organized a lucky draw and a publicity programme in February and March 2016, respectively. A total of 5 participants, whose abstinence were biochemically validated at 3 months, won the lucky draw prizes (each of HK\$10,000 gift voucher). Among the 67 participants who joined the publicity programme, the biochemically validated quitters (n=11) had been interviewed by COSH and a champion was selected to receive a prize of travel voucher at HK\$25,000 to Australia, where the 1<sup>st</sup> and the 2<sup>nd</sup> runner-up winners received a cash prize of travel voucher at HK\$15,000 to Singapore and HK\$10,000 to Thailand, respectively.

### 2.2 Interventions and follow-up

**Active Referral group:** Participants received brief SC advice and were actively referred to existing SC services in Hong Kong. Brief advice was delivered using the AWARD model<sup>8</sup>, face-to-face at baseline (~1 minute) and via telephones at follow-ups. The AWARD model consists of the following components: Ask about smoking history; Warn about the high risk with the use of the health warning leaflet; Advice to quit as soon as possible and to quit within 3 months (to become eligible to win the prizes); Refer smokers to SC services; and Do it again. Participants also received an A4 color double-page printed leaflet which contained highlights of the risks of 1/2 smokers and 2/3 young smokers died due to smoking, (1) a full list of diseases related to active and secondhand smoking, (2) 10 scary pictures featuring smoking-induced diseases, (3) information on the benefits of quitting, and (4) messages encouraging participants to quit and call the integrated SC hotline managed by the Department of Health (DH). Participants received brief booster advice at 1 and 2 months.

Participants were also assisted to make early appointment in the following SC services in Hong Kong: DH, Tung Wah Group of Hospitals Integrated Center on Smoking Cessation, Hospital Authority Smoking Counseling and Cessation Centre in 18 districts, Pok Oi Hospital Chinese Medicine Smoking Cessation Services and Youth Quitline of The University of Hong Kong<sup>16</sup>.

SC ambassadors introduced the SC services to participants using a pocket size SC services information card containing brief information (e.g. hotline, address and operation hours) and highlights (e.g. provision of assistance by experienced, professional SC nurses or physicians) of each SC service. Participants who consented for the transferal of their contact details (telephone numbers and names) through COSH to their selected SC service providers, received proactive phone calls from the service providers for telephone SC counseling or booking a SC clinic appointment.

**Brief Advice group:** Participants only received the same brief SC advice using the AWARD model and the health warning leaflet as the Active Referral group did. They were verbally encouraged to book an appointment with SC service providers by themselves (R of AWARD) but did not receive the SC information card. Participants also received brief booster advice at 1 and 2 months.

**Control group:** Participants received very brief, minimal general SC advice (<30 seconds) and a 12-page self-help SC booklet, which was designed by COSH and routinely used in QTW Contests.

**Non-trial group:** The following participants joined the QTW Contest and were classified as the “non-trial group”: (1) chose to participate in COSH’s publicity programme, which had other prizes; (2) refused to participate in the RCT; and (3) were recruited from the workplace where additional incentives were provided by the employers. The non-trial participants received the same intervention received by the RCT participants in the same recruitment session. All of them could receive the same monetary incentive after passing the biochemical validation for abstinence at 3 and 6 months.

All participants were assessed for their smoking status and quitting progress through telephone interviews at 1 and 2 months, followed by a booster advice (Active Referral group and Brief Advice group only), and then at 3 and 6 months for assessment only. The booster interventions included the message of absolute risk of death due to smoking (“one in two smokers are killed by smoking.”). About 7 calls and 1 voice message were made before a participant was treated as unreachable. Self-reported quitters (did not smoke, even a puff, in the past 7 days) at 3 and 6 months were invited to participate in the biochemical validations. HKU staff assessed self-reported quitter’s exhaled CO level and saliva cotinine level in the biochemical validation and all validated quitters could receive a cash incentive of HK\$500. To boost the retention rate, participants who completed all 4 follow-up interviews could receive another cash incentive (HK\$100).

The primary outcomes were the self-reported 7-day point prevalence (PP) quit rate at 3 and 6 months. The secondary outcomes were (1) biochemically validated quit rates, (2) rate of smoking reduction by at least half of the baseline cigarette consumption and (3) self-reported SC service used at 3 and 6 months.

The socio-demographic and smoking characteristics at baseline of all participants (N=1,306) were described. We compared the primary and secondary outcomes among the 3 groups. We adopted the intention-to-treat (ITT) analysis (assuming that non-respondents at the follow-up did not change their baseline smoking behavior) and complete-case (CC) analysis (excluding participants who were lost to follow-up) to calculate the self-reported and biochemically validated quit rates and other outcomes.

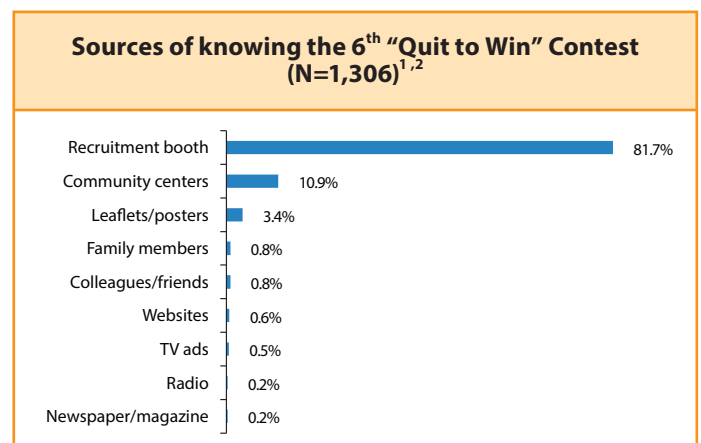
We also reported participants’ reasons to quit, methods to quit, withdrawal symptoms experienced, self-efficacy in quitting, perceived social support for quitting, use of SC aids and perception of follow-up calls.

### 3. Results

In all the 70 recruitment sessions of the 6<sup>th</sup> “Quit to Win” Contest, 60 trained SC ambassadors and 39 staff from NGOs participated in the on-site promotion and recruited 1,306 Chinese adult daily smokers to participate in the Contest. About 191,000 people passed by the recruitment booths. Besides, about 12,600 people made inquiries about smoking cessation or participated in the game booths. The recruitment staff approached over 8,200 smokers and over 17,600 non-smokers in all the activities.

Of the 1,347 screened smokers who intended to quit smoking, 29 (2.2%) did not meet the inclusion criteria, and 12 (0.9%) refused to participate in the Contest, making up a final of 1,306 (97.0%) participants in the Contest. The recruitment booth of the QTW Contest was the leading source of information about the QTW Contest for the participants (81.7%). The second source was community centers (10.9%) and few participants knew it from leaflets/posters (3.4%) (Figure 1).

**Figure 1**



<sup>1</sup> Missing data were not displayed.

<sup>2</sup> Participants could choose more than one option.

In the 1,306 eligible participants, 1,226 (93.9%) consented to participate in the RCT. Sixty-seven (5.1%) participants in the publicity programme and 13 (1.0%) participants who refused to join the RCT or were recruited from a specific workplace were combined and analyzed in the non-trial group. Of the 1,226 participants in the RCT, 402 (32.8%) were allocated to the Active Referral group, 416 (33.9%) to the Brief Advice group, and 408 (33.3%) to the Control group.

**Table 1 Socio-demographic characteristics of all participants (N=1,306)**

n (%)	Total (N=1,306)	Non-trial (N=80)	Active Referral (N=402)	Brief Advice (N=416)	Control (N=408)
Age, mean $\pm$ SD, years	41.9 $\pm$ 14.7	40.0 $\pm$ 13.3	40.8 $\pm$ 14.9	42.4 $\pm$ 14.7	42.8 $\pm$ 14.9
<b>Gender</b>					
Male	1,065 (81.5)	74 (92.5)	317 (78.9)	328 (78.8)	346 (84.8)
Female	241 (18.5)	6 (7.5)	85 (21.1)	88 (21.2)	62 (15.2)
<b>Marital status</b>					
Single	436 (33.4)	27 (33.8)	157 (39.1)	129 (31.0)	123 (30.1)
Married/ Cohabited	749 (57.4)	47 (58.8)	214 (53.2)	249 (59.9)	239 (58.6)
Others	66 (5.1)	3 (3.8)	21 (5.2)	23 (5.5)	19 (4.7)
Missing	55 (4.2)	3 (3.8)	10 (2.5)	15 (3.6)	27 (6.6)
<b>Child</b>					
1 or more	651 (49.8)	34 (42.5)	199 (49.5)	211 (50.7)	207 (50.7)
No	490 (37.5)	39 (48.8)	159 (39.6)	147 (35.3)	145 (35.5)
Missing	165 (12.6)	7 (8.8)	44 (10.9)	58 (13.9)	56 (13.7)
<b>Education level</b>					
No formal education	17 (1.3)	3 (3.8)	6 (1.5)	2 (0.5)	6 (1.5)
Elementary education	101 (7.7)	7 (8.8)	21 (5.2)	29 (7.0)	44 (10.8)
Junior secondary education	271 (20.8)	12 (15.0)	89 (22.1)	71 (17.1)	99 (24.3)
Senior secondary education	499 (38.2)	29 (36.3)	170 (42.3)	161 (38.7)	139 (34.1)
Post-secondary or above	267 (20.4)	27 (33.8)	88 (21.9)	85 (20.4)	67 (16.4)
Missing	151 (11.6)	2 (2.5)	28 (7.0)	68 (16.3)	53 (13.0)
<b>Employment status</b>					
Student	45 (3.4)	2 (2.5)	21 (5.2)	13 (3.1)	9 (2.2)
Self-employed/ employed	908 (69.5)	67 (83.8)	282 (70.1)	282 (67.8)	277 (67.9)
Unemployed	51 (3.9)	2 (2.5)	21 (5.2)	12 (2.9)	16 (3.9)
Housewife	50 (3.8)	1 (1.3)	9 (2.2)	26 (6.3)	14 (3.4)
Retired	119 (9.1)	6 (7.5)	35 (8.7)	32 (7.7)	46 (11.3)
Missing	133 (10.2)	2 (2.5)	34 (8.5)	51 (12.3)	46 (11.3)
<b>Monthly household income (HK\$)</b>					
Less than 10,000	192 (14.7)	10 (12.5)	59 (14.7)	53 (12.7)	70 (17.2)
10,000-19,999	401 (30.7)	29 (36.3)	140 (34.8)	113 (27.2)	119 (29.2)
20,000-29,999	271 (20.8)	17 (21.3)	91 (22.6)	97 (23.3)	66 (16.2)
30,000-39,999	127 (9.7)	9 (11.3)	35 (8.7)	45 (10.8)	38 (9.3)
40,000 or more	106 (8.1)	10 (12.5)	36 (9.0)	27 (6.5)	33 (8.1)
Missing	209 (16.0)	5 (6.3)	41 (10.2)	81 (19.5)	82 (20.1)
<b>Housing condition</b>					
Public rental housing	497 (38.1)	27 (33.8)	144 (35.8)	146 (35.1)	180 (44.1)
Public housing (purchased)	112 (8.6)	6 (7.5)	48 (11.9)	16 (3.8)	42 (10.3)
Home Ownership Scheme	155 (11.9)	10 (12.5)	58 (14.4)	51 (12.3)	36 (8.8)
Private housing (rental)	166 (12.7)	10 (12.5)	52 (12.9)	65 (15.6)	39 (9.6)
Private housing (purchased)	215 (16.5)	23 (28.8)	61 (15.2)	79 (19.0)	52 (12.7)
Others	17 (1.3)	2 (2.5)	7 (1.7)	3 (0.7)	5 (1.2)
Missing	144 (11.0)	2 (2.5)	32 (8.0)	56 (13.5)	54 (13.2)

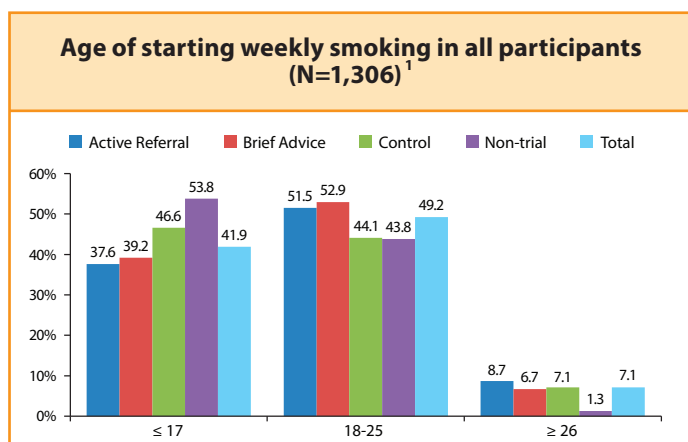
### 3.1 Socio-demographic characteristics of all participants

The average age of participants was 41.9 (SD=14.7) years and most participants were male (81.5%), employed (69.5%) and had received junior secondary or above education (79.4%). More than half (57.4%) were married and about half had at least 1 child (49.8%) and monthly household income less than HK\$20,000 (45.4%). More than one-third lived in public rental housing (38.1%) (Table 1).

### 3.2 Smoking profile

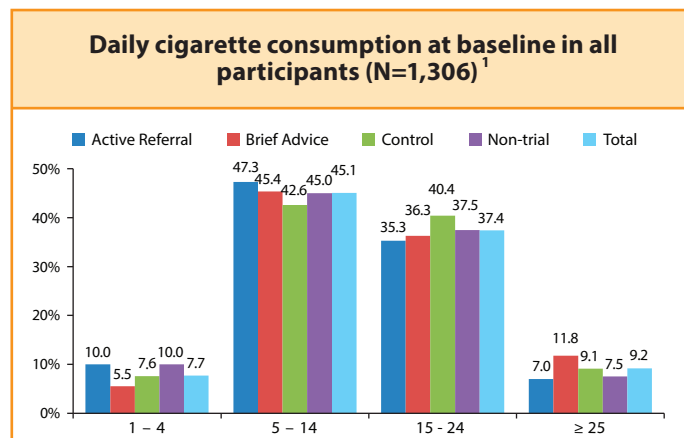
The average age of starting weekly smoking was 18.5 (SD=5.5) years and about half (41.9%) started smoking before 18 (Figure 2). The mean daily cigarette consumption was 23.4 (SD=14.6), while 45.1% consumed 5-14 cigarettes and 37.4% consumed 15-24 per day (Figure 3). About half (49.1%) had light nicotine dependence measured by the Heavy Smoking Index (HSI≤2) (Figure 4). More than half (52.8%) had made a quit attempt (smoking abstinence ≥24 hours) before, and 36.1% had attempted in more than 1 year ago (Figure 5). More than half (50.7%) decided to quit within 30 days since participating in the Contest (Figure 6).

Figure 2



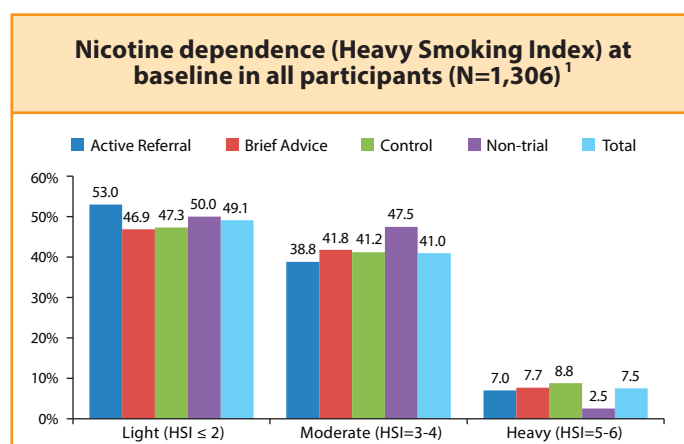
<sup>1</sup> Missing data were not displayed.

Figure 3



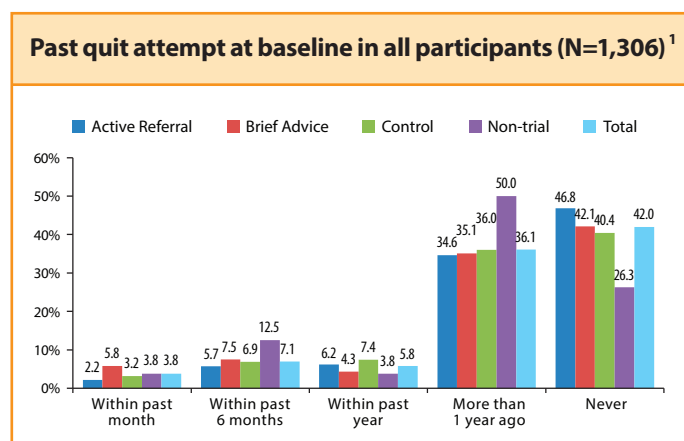
<sup>1</sup> Missing data were not displayed.

Figure 4



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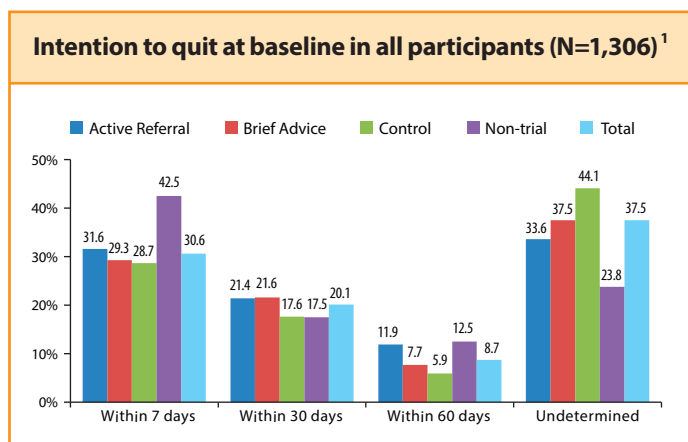
Figure 5



<sup>1</sup> Missing data were not displayed.



**Figure 6**



<sup>1</sup> Missing data were not displayed.

### 3.3 Baseline referral status of participants who received active referral intervention

At baseline, 428 participants received active referral intervention. 402 (93.9%) were participants in the Active Referral group of the RCT and 26 (6.1%) were in the non-trial group. Most of them (80.8%) had chosen an SC service provider at baseline and the proportion was 82.1% in the Active Referral group and 61.5% in the non-trial group. The remaining participants had not decided a smoking cessation service yet (17.1%) or refused to be referred (2.1%) (Table 2).

**Table 2 Referral status at baseline**

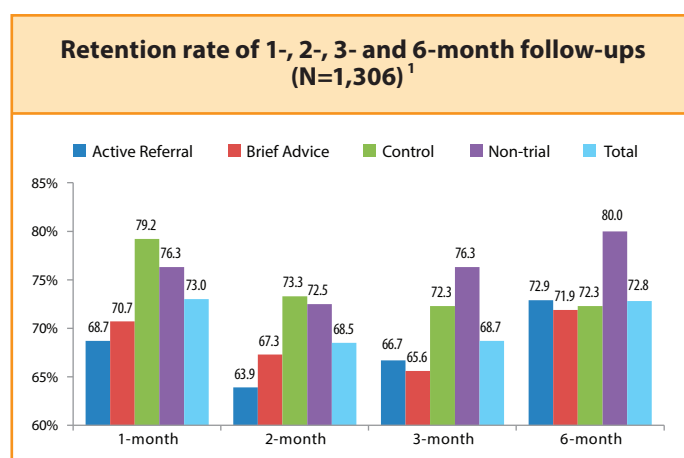
	Total (N=428)	Non-trial (N=26)	RCT (Active Referral group) (N=402)
<b>Had chosen any smoking cessation services</b>	346 (80.8)	16 (61.5)	330 (82.1)
<b>Had not decided a smoking cessation service yet</b>	73 (17.1)	4 (15.4)	69 (17.2)
<b>Refused to be referred</b>	9 (2.1)	6 (23.1)	3 (0.7)

### 3.4 1-, 2-, 3- and 6-month follow-ups results

#### Retention rate

All participants were followed through telephone interviews at 1, 2, 3 and 6 months with the corresponding overall retention rates (including non-trial group) of 73.0%, 68.5%, 68.7% and 72.8%. At 3 months, the retention rates of the Active Referral, Brief Advice and Control groups were 66.7%, 65.6% and 72.3%, respectively. The corresponding retention rates at 6 months were 72.9%, 71.9% and 72.3% and the differences were not statistically significant (Figure 7).

**Figure 7**



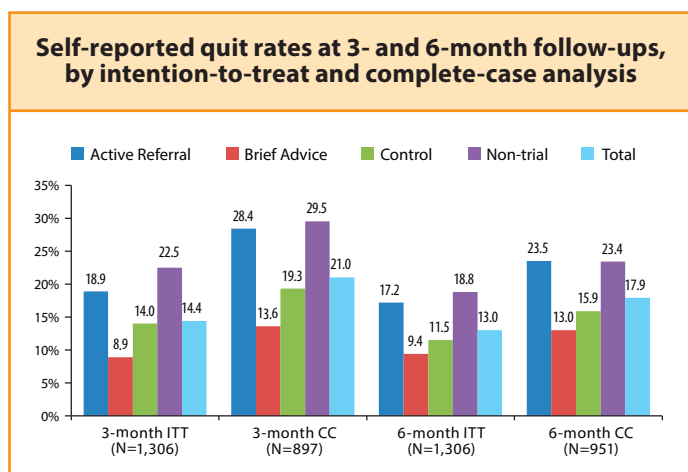
<sup>1</sup> Missing data were not displayed.

#### Self-reported quit rate at 3- and 6-month follow-ups

At 3-month follow-up, by ITT analysis, the overall 7-day PP quit rate was 14.4% (95% CI 12.5% to 16.3%). Compared with the Control group (14.0%; 95% CI 10.6% to 17.4%), the Active Referral group (18.9%; 95% CI 15.1% to 22.7%) had a marginally significantly higher quit rate ( $p=0.06$ ) and the Brief Advice group had a significantly lower (8.9%, 95%CI 6.2% to 11.6%) quit rate ( $p=0.02$ ), probably because the Brief Advice group had the lowest retention rate (as those unsuccessfully followed-up participants were assumed to have not quit). The Active Referral group also had a significantly higher quit rate than the Brief Advice group ( $p<0.001$ ). By complete case (CC) analysis, the Active Referral group (28.4%, 95% CI 23.0% to 33.8%) had a significantly higher quit rate than the Brief Advice group (13.6%; 95% CI 9.5% to 17.7%;  $p<0.001$ ) and the Control group (19.3%; 95% CI 14.8% to 23.8%;  $p=0.01$ ) while the difference between the Brief Advice and Control groups was not statistically significant ( $p=0.07$ ) (Figure 8).

At 6-month follow-up, by ITT analysis, the overall quit rate was 13.0% (95% CI 11.2% to 14.8%). The Active Referral group (17.2%; 95% CI 13.5% to 20.9%) had a significantly higher quit rate than the Brief Advice (9.4%; 95% CI 6.6% to 12.2%;  $p=0.001$ ) and Control groups (11.5%; 95% CI 8.4% to 14.6%  $p=0.02$ ). The difference between the Brief Advice group and Control group was non-significant ( $p=0.31$ ). Similar results were observed using CC analysis (Figure 8).

**Figure 8**



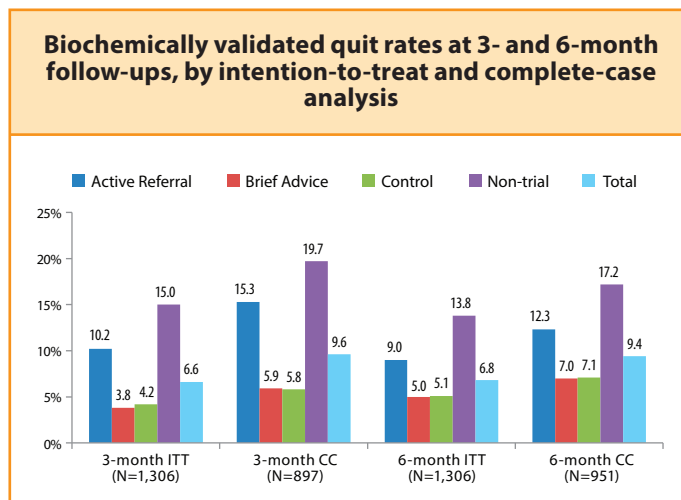
ITT: Intention-to-treat analysis; CC: Complete-case analysis

**Biochemically validated quit rate at 3- and 6-month follow-ups**

At 3-month follow-up, among the 188 self-reported quitters (including non-trial group), 97 (51.6%) participated in the biochemical validation and 88.7% passed the test. By ITT analysis, the overall validated quit rate was 6.6%. The Active Referral group (10.2%) had a significantly higher rate than the Brief Advice (3.8%) and Control groups (4.2%) (all  $p<0.001$ ). The Brief Advice and Control groups had similar quit rates. Similar results were observed using CC analysis (Figure 9).

At 6-month follow-up, 89 out of 170 (52.4%) self-reported quitters (including non-trial group) participated in the biochemical validation and all passed the test resulting in an overall validated quit rate of 6.8%, by ITT analysis. The Active Referral group (9.0%) were significantly higher than the Brief Advice (5.0%) and Control groups (5.1%) (all  $p=0.03$ ). The Brief Advice group had a non-significantly lower rate than the Control group ( $p=0.95$ ). Similar results were observed using CC analysis (Figure 9).

**Figure 9**

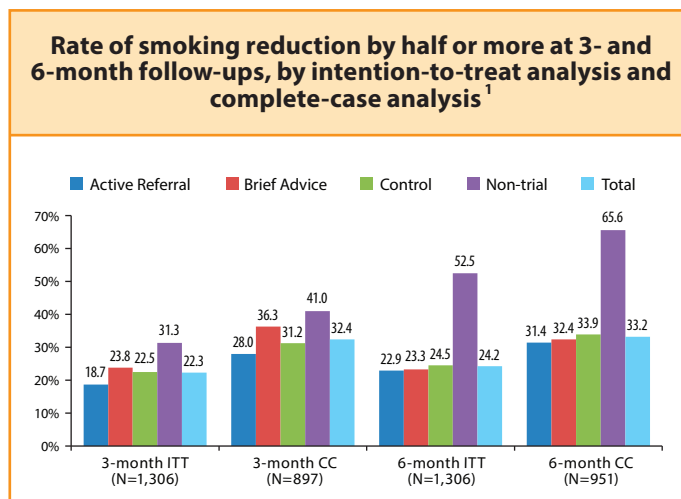


ITT: Intention-to-treat analysis; CC: Complete-case analysis

**Smoking reduction rate at 3- and 6-month follow-ups**

By ITT analysis and excluding quitters as reducers, 22.3% and 24.2% of all participants reduced daily cigarette consumption by half or more at 3 and 6 months and the difference was not significant ( $p>0.05$ ). By CC analysis, the reduction rate in the Brief Advice group (36.3%) was significantly higher than the Active Referral group (28.0%) at 3 months ( $p=0.04$ ) (Figure 10).

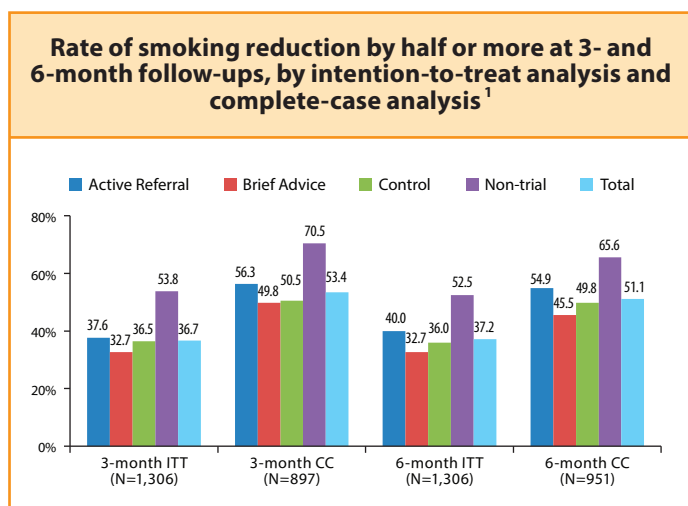
**Figure 10**



<sup>1</sup> Quitters were excluded in the numerator but included in the denominator.

By ITT analysis and including quitters as reducers, 36.7% and 37.2% of all participants had reduced daily cigarette consumption by more than half at 3 and 6 months respectively. At 3-month follow-up, the reduction rate in the Active Referral (37.6%) was similar to that in the Brief Advice group (32.7%) and Control group (36.5%) (all  $p > 0.05$ ). Reduction rates at 6 months were also similar in all groups (Active Referral: 40.0%; Brief Advice: 32.7%; and Control: 36.0%) (Figure 11).

**Figure 11**

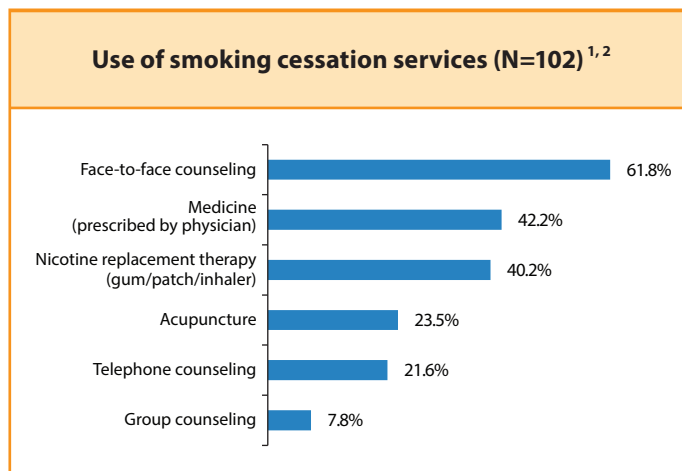


<sup>1</sup> Quitters were included in the numerator and denominator.

### Smoking cessation services used

In the Active Referral group, 87.3% had chosen an SC service provider during the study period and 71.5% of them received proactive contacts from the SC service providers. Among 251 participants who received proactive contact from the SC service providers, 40.6% used the service for quitting. The 4 most commonly used services were: (1) face-to-face counseling (61.8%), (2) medicine (prescribed by physicians) (42.2%), (3) nicotine replacement therapy (i.e. gum/patch/inhaler) (40.2%) and (4) acupuncture (23.5%) (Figure 12).

**Figure 12**

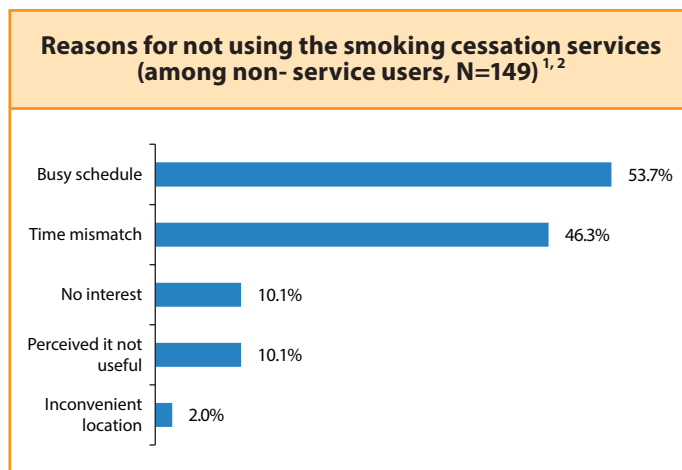


<sup>1</sup> Missing data were not displayed.

<sup>2</sup> Participants could choose more than one service.

Among the 149 participants who received proactive contact but had not used the SC service during the study period, busy schedule (53.7%) and time mismatch (46.3%) were the 2 most commonly reported reasons (Figure 13).

**Figure 13**



<sup>1</sup> Missing data were not displayed.

<sup>2</sup> Participants could choose more than one reason.

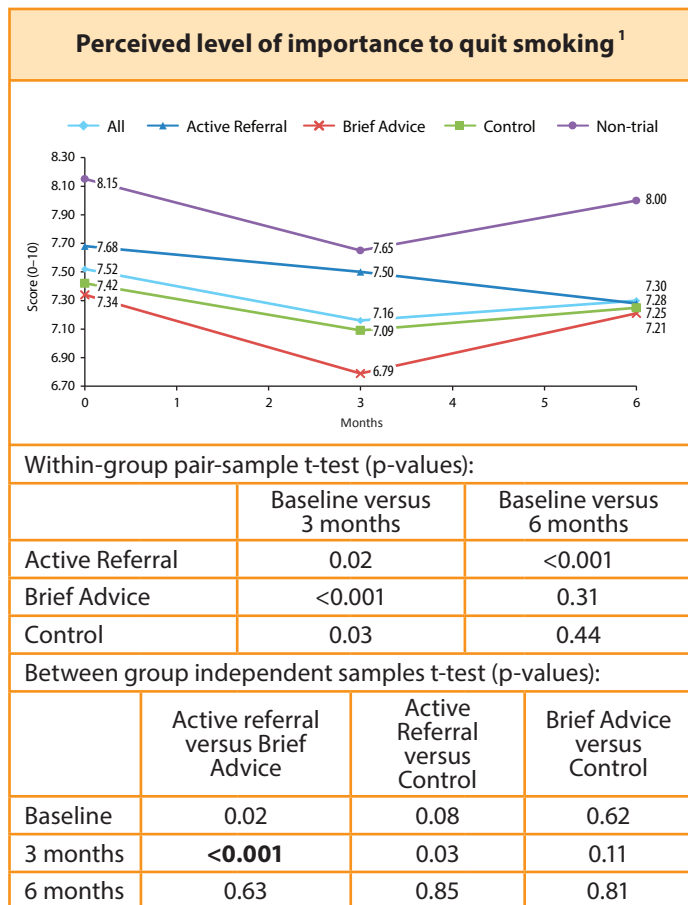
### Perceived importance of quitting

The overall mean scores of perceived importance of quitting at baseline, 3- and 6-month follow-ups were 7.52, 7.16 and 7.30, respectively. Compared with the baseline, the mean scores of all the groups dropped significantly at 3 months (Active Referral: from 7.68 to 7.50,  $p=0.02$ ; Brief Advice: from 7.34 to 6.79,  $p<0.001$ ; and Control: from 7.42 to 7.09,  $p=0.03$ ). The Active Referral group had a continuous drop after 3 months but the Brief Advice and Control groups rebounded after 3 months. The difference of mean scores between baseline and 6 months



was significantly different in the Active Referral group only (from 7.68 to 7.28,  $p < 0.001$ ) but not in the Brief Advice (from 7.34 to 7.21,  $p = 0.31$ ) and Control groups (from 7.42 to 7.25,  $p = 0.44$ ). Significant difference was observed between Active Referral and Brief Advice groups at baseline ( $p = 0.02$ ) and 3 months ( $p < 0.001$ ), and between Active Referral and Control group at 3 months ( $p = 0.03$ ) (Figure 14).

**Figure 14**

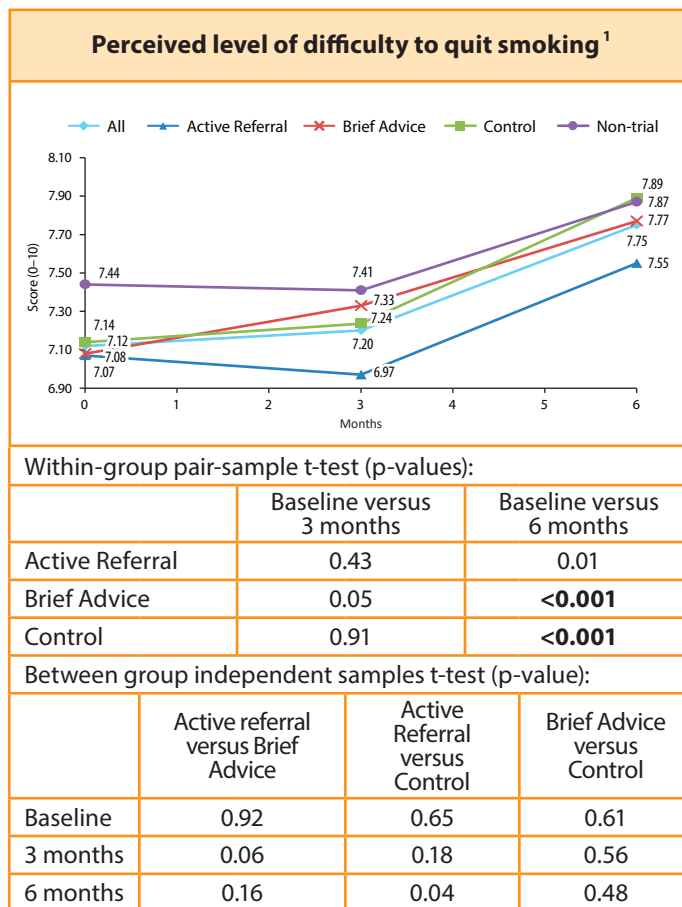


<sup>1</sup>Scale 0-10, 0 lowest, 10 highest; analysis excluded missing data.

### Perceived difficulty of quitting

The overall mean scores of perceived difficulty of quitting increased from baseline (7.12) to 3 months (7.20) and 6 months (7.75). Compared with the baseline, the Active Referral and Control groups had significantly higher mean scores at 6 months (Active Referral: from 7.07 to 7.55,  $p = 0.01$ ; Control group: from 7.14 to 7.89,  $p < 0.001$ ). The Brief Advice group had significantly higher mean scores at 3 and 6 months (from 7.08 to 7.33 and 7.77,  $p = 0.05$  and  $< 0.001$ , respectively) compared with the baseline score. Significant difference was observed only between Active Referral and Control groups at 6 months ( $p = 0.04$ ) (Figure 15).

**Figure 15**

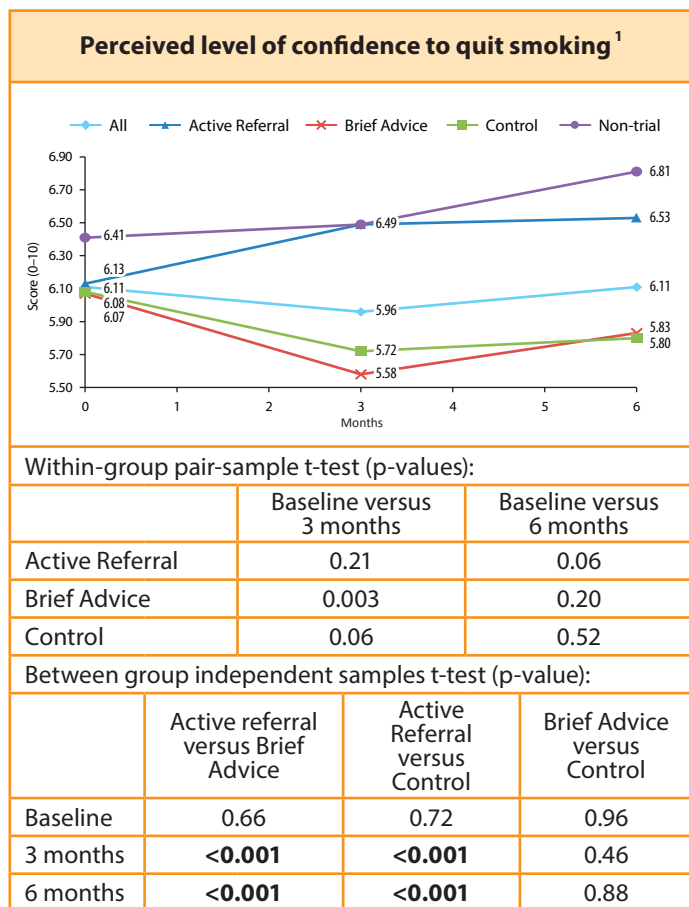


<sup>1</sup>Scale 0-10, 0 lowest, 10 highest; analysis excluded missing data.

### Perceived confidence of quitting

The overall mean scores of perceived confidence on quitting at baseline, 3 and 6 months were 6.11, 5.96 and 6.11, respectively. Compared with the baseline, the mean scores of the Brief Advice and Control groups dropped at 3 months. Only the decrease in the Brief Advice group showed statistical significance ( $p = 0.003$ ). The mean score in all groups rebounded after 3 months and the scores at 6 months became similar to those at the baseline. The Active Referral group had higher mean score than the Brief Advice and Control groups at 3 and 6 months (all  $p < 0.001$ ) (Figure 16).

**Figure 16**



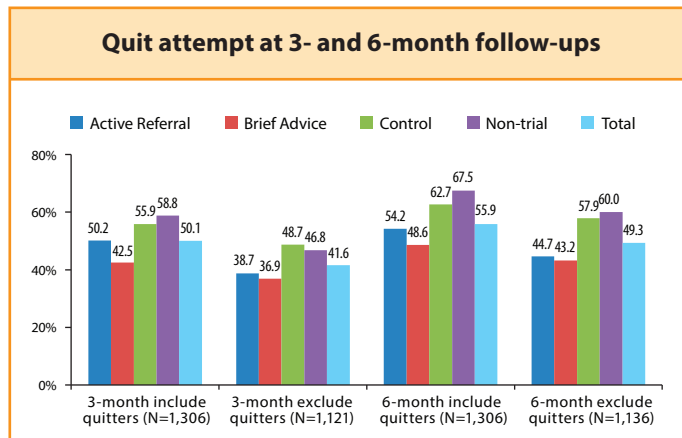
<sup>1</sup> Scale 0-10, 0 lowest, 10 highest; analysis excluded missing data.

**Quit attempt at 3- and 6-month follow-ups**

Including quitters, 50.1% and 55.9% of the participants had at least one quit attempt at 3 and 6 months, respectively. At 3 months, quit attempt rates were higher in the Active Referral group (50.2%) and the Control group (55.9%) compared with the Brief Advice group (42.5%) (p=0.03 and <0.001, respectively). At 6 months, the Control group (62.7%) had a higher quit attempt rate than the Active Referral group (54.2%, p=0.01) and the Brief Advice group (48.6%, p<0.001) (Figure 17).

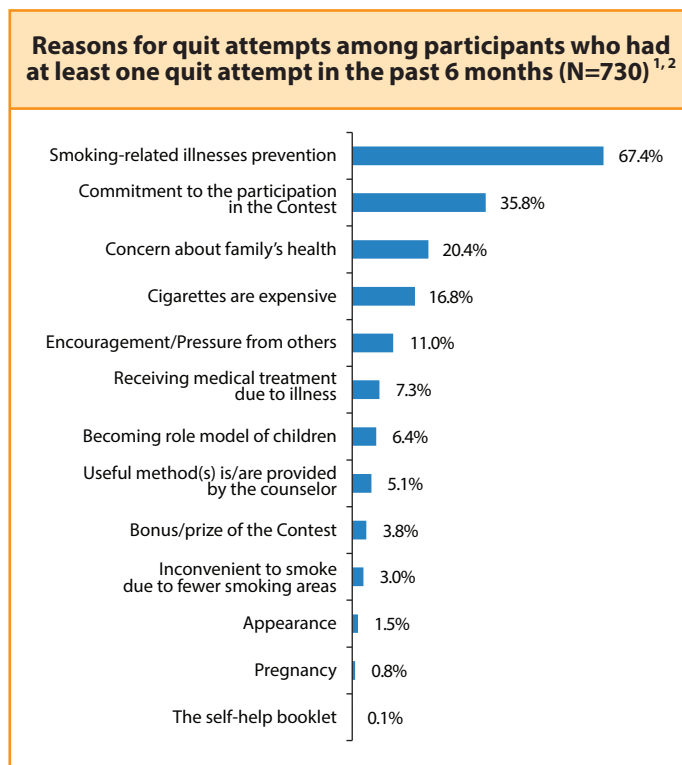
Excluding quitters, 41.6% and 49.3% of the participants had at least one quit attempt at 3 and 6 months, respectively. Control group (3 months: 48.7%; 6 months: 57.9%) had a higher quit attempt rate at both months when compared with Active Referral group (38.7%, p=0.008; 44.7%, p<0.001) and Brief Advice group (36.9%, p<0.001; 43.2%, p<0.001). (Figure 17).

**Figure 17**



During the study period, the top 3 reasons of having quit attempt were: (1) smoking-related illness prevention (67.4%), (2) commitment to the participation in the Contest (35.8%), and (3) concerned about family's health (20.4%) (Figure 18).

**Figure 18**

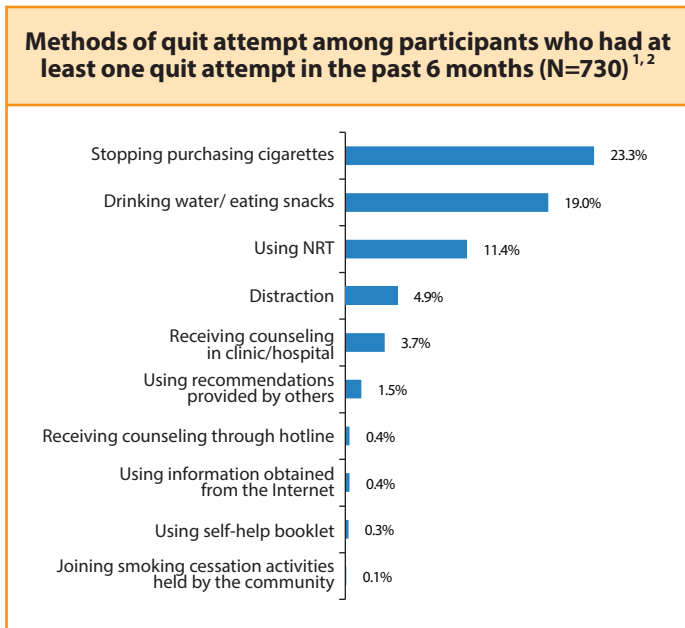


<sup>1</sup> Participants who were lost to follow-up were excluded.

<sup>2</sup> Participants could choose more than one reason.

The 3 most commonly used methods for quitting were: (1) stopping purchasing cigarettes (23.3%), (2) drinking water/eating snacks (19.0%), (3) using NRT (11.4%) (Figure 19). About half experienced the craving for tobacco (43.6%). Other commonly experienced symptoms included irritated/lose temper/angry (19.7%) and difficult to concentrate (19.5%) (Figure 20).

**Figure 19**



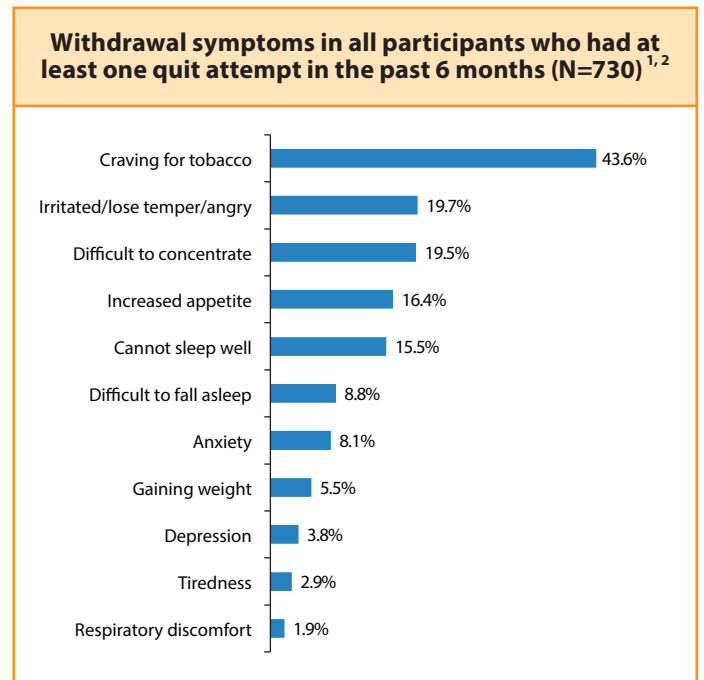
<sup>1</sup> Participants who were lost to follow-up were excluded.

<sup>2</sup> Participants could choose more than one method.

### **Social support during smoking cessation**

Participants who responded to the 6-month follow-up perceived support for quitting from: (1) friends (23.8%), (2) spouse/partner (20.7%), (3) family (14.5%), and (4) parents (11.8%). However, about one-third (31.8%) perceived no social support (Figure 21).

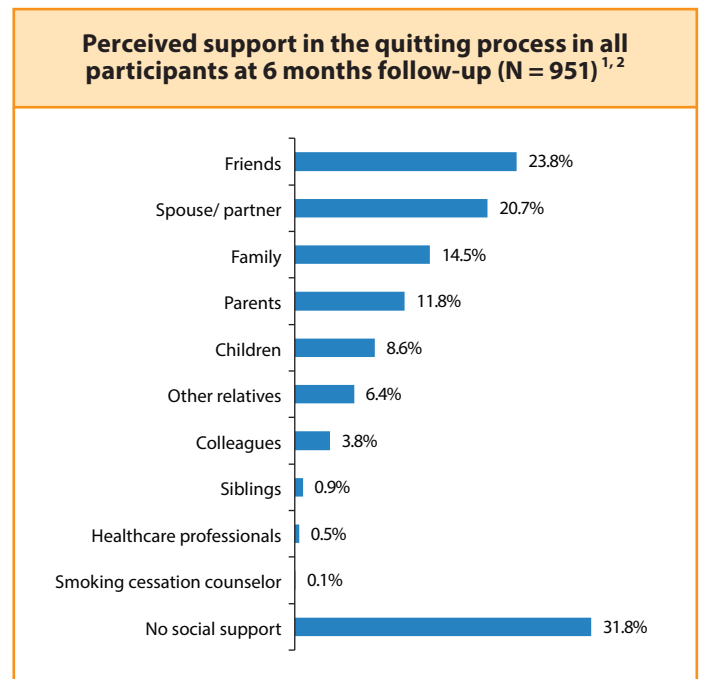
**Figure 20**



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

<sup>2</sup> Participants could choose more than one symptom.

**Figure 21**



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

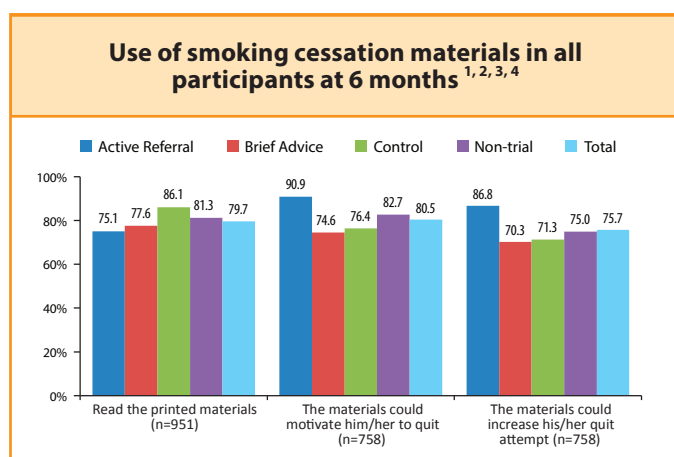
<sup>2</sup> Participants could choose more than one reason.

## Use and satisfaction of smoking cessation aids

### Printed materials

Among participants who responded to the 6-month follow-up, most of them (79.7%) read the printed SC materials (Figure 22). Of the 758 participants who read the materials, significantly more participants in the Active Referral group reported that the printed materials could motivate them to quit (Active Referral: 90.9%; Brief Advice: 74.6%; and Control: 76.4%;  $p$  for Active Referral versus Brief Advice  $<0.001$ , for Active Referral versus Control  $<0.001$ ; and Brief Advice versus Control=0.64), and increase their quit attempt (Active Referral: 86.8%; Brief Advice: 70.3%; and Control: 71.3%;  $p$  for Active Referral versus Brief Advice  $<0.001$ , Active Referral versus Control  $<0.001$  and Brief Advice versus Control=0.81).

Figure 22



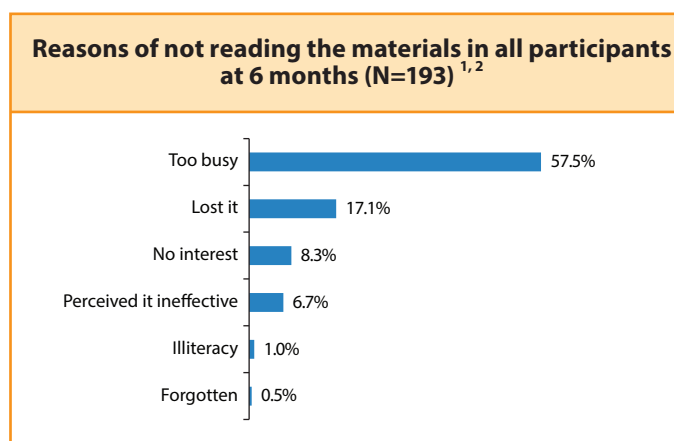
<sup>1</sup> Participants could choose more than one answer.

<sup>2</sup> Participants who were lost to follow-up were excluded.

<sup>3</sup> Missing data were not displayed.

<sup>4</sup> Participants who had read the printed materials only.

Figure 23



<sup>1</sup> Participants could choose more than one answer.

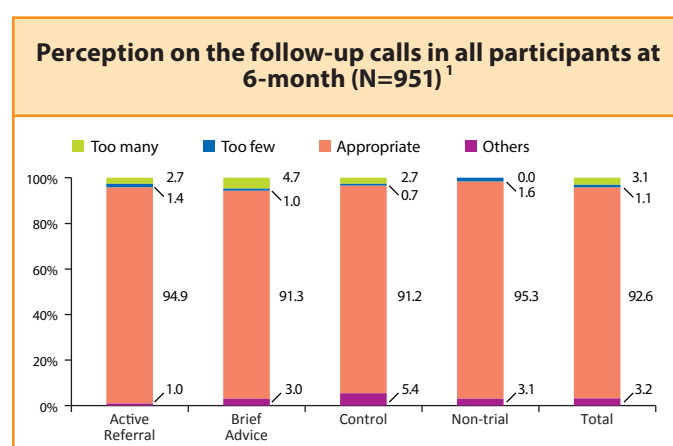
<sup>2</sup> Participants who were lost to follow-up at 6 months and missing data were excluded.

Of the 193 (20.3%) participants who did not read the materials, the 3 most common reasons were: (1) too busy (57.5%), (2) lost it (17.1%) and (3) no interest (8.3%) (Figure 23).

### Perception on the follow-up calls

Of the 951 participants who responded to the 6-month follow-up, 92.6% agreed that the frequency of the follow-up calls was appropriate. When compared with the Control group (91.2%), more participants in the Active Referral group perceived the frequency as appropriate (94.9%;  $p=0.008$ ) (Figure 24).

Figure 24



<sup>1</sup> Participants who were lost to follow-up at 6 months were excluded; missing data were not displayed.

## 4. Discussion

From 20 June to 24 September 2015, the 6<sup>th</sup> "Quit to Win" Contest successfully disseminated the smoke-free messages in the community by organizing 70 recruitment activities with 99 staff/volunteers from NGOs and university undergraduate students participating in the promotion and recruitment throughout all 18 districts in Hong Kong. Over 8,000 smokers were approached by the recruitment staff, over 6,800 smokers received the smoking cessation promotion leaflets, 1,306 smokers joined the Contest and 1,226 joined the RCT. By ITT analysis, the self-reported quit rate for all participants was 14.4% at 3 months and 13.0% at 6 months, which are higher than that observed in the previous Contests (3-month self-reported quit rate was 10.6% in 2012, 9.6% in 2013 and 9.9% in 2014). The overall quit rate in 2015 was also the highest compared with the previous Contests, probably due to the much higher quit rate in those who had been actively referred to and had used the existing SC services.

The findings suggested that, in addition to the small financial incentive, motivating smokers to quit using brief SC advice and actively referring smokers to SC services can increase abstinence, the validated quit rate nearly doubled that of the minimal cessation assistance. Moreover, the active referral intervention was widely accepted by the participants and most of them consented to be referred (87.3%) in Active Referral group. Although only about 30% of them used the SC service (29.1%), this was higher than that observed in other overseas trials which only showed 5.0% to 28.2% of usage<sup>14,17</sup>. In a previous telephone survey on US smoker's willingness to receive different SC strategies, 46.4% smokers claimed that they were willing to utilize proactive telephone service<sup>18</sup>. The Hong Kong Thematic Household Survey (2015) showed that among the 68% smokers who were aware of the services and had never tried them, most of them (96%) were unwilling to seek SC services. Our results found that 62.4% actively referred smokers eventually received the proactive call from their chosen SC service providers suggesting that the active referral plus brief advice intervention would increase smokers' acceptance for proactive telephone services. Regarding the SC service usage among smokers who were proactively contacted, the proportions of smokers who reported having used the face-to-face counseling and group counseling in our study (25.1% and 3.6%) were far lower than the previous study which reported that 55.7% and 36.1% smokers showed their willingness to use them<sup>18</sup>. The lack of knowledge about effective SC treatments was a major barrier for SC service use<sup>19</sup>. The face-to-face introduction of comprehensive SC services and the SC service information card to the smokers in the active referral group can increase quit attempt and quitting. However, busy schedule and time mismatch were two main reasons of not using the referred services. Most participants were employees and unable to attend the SC clinic services which usually operated during weekdays from 9am to 5pm in Hong Kong. More support from the employers, such as provision of leave allowance for attending SC services, might increase smokers' use of the services. Future studies should also explore the use of online platforms (such as website and instant messaging) to deliver SC services.

We found that the on-site brief SC advice using AWARD model plus a health warning leaflet alone (Brief Advice group) did not have an additional effect compared with the Control group (general minimal SC advice and a booklet) on all study outcomes, which was inconsistent with the previous study in "Quit to Win" Contest 2010 using similar SC advice but with a more comprehensive SC self-help booklet<sup>9</sup>. We found that the participants in both studies (QW 2010 and QW 2015) had similar socio-demographic characteristics and smoking behavior, except fewer participants had past quit attempt in 2015 (52.8%) than 2010 (68.4%). Given that the leaflet is cheaper than a booklet, it may be more cost-effective to use the leaflet in subsequent SC promotion campaigns. Nevertheless, the results suggested the importance to design and evaluate the most effective advice, leaflet and methods of referring smokers to evidence-based SC services. Future studies on brief advice and active referral should test the effects of different intensity of active referral (e.g. more intensive such as booking the SC appointment on-site

during face-to-face intervention) and the combined effects with other cost-effective and brief SC interventions (e.g. SC SMS messaging), i.e. cocktail interventions including several different and very brief interventions.

It is worth-noting that the effects of the active referral and brief advice intervention might be underestimated as the retention rates at 1- and 2-month follow-ups of the Active Referral and Brief Advice groups were lower than that of the Control group. Unfollowed participants were not able to receive the booster intervention which might then reduce the intervention intensity.

## 5. Conclusions

In conclusion, the 6<sup>th</sup> QW Contest successfully promoted SC and reached a large number of smokers in the community who were otherwise unlikely to seek help from SC services. QW Contest provides an important platform to disseminate SC messages to a vast number of smokers and non-smokers. The majority (79.7%) of the 6<sup>th</sup> QW Contest participants read our printed SC material (e.g. health warning leaflet, SC service information card and self-help booklet) and perceived them as effective to quit smoking. The active referral intervention showed increased abstinence at 6 months, suggesting smokers can be readily referred to SC services by trained community health workers or volunteers. Early proactive contact and referring smokers to SC service providers enhanced SC service use, which significantly increased abstinence. Longer-term follow-up is warranted to detect the effects of brief advice and active referral, and cocktail interventions including different combinations of very brief interventions, on quitting.

## 6. Clinical Trial Registration

Clinical trial registration number: NCT02539875 (<https://clinicaltrials.gov/>)

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