

Effectiveness of 5A–5R Counseling with or without Mobile Phone Based Support on Tobacco Cessation in Rural Primary Care Settings

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Abstract

Background

Tobacco use, encompassing both smoking and smokeless tobacco, constitutes a significant global health risk. In Bangladesh, 35.3% of adults continue to use tobacco. Smoking cessation attempts without proper methods are often unsuccessful, emphasising the need for effective strategies. This study aims to evaluate the effectiveness of WHO 5A-5R counselling services, delivered either exclusively in person or with mobile phone-based assistance, among adults in primary healthcare settings in Bangladesh.

Methods

A small-scale intervention study was conducted over nine months in three unions of Birganj, Dinajpur district, Bangladesh. The study included 668 adult participants who were current daily tobacco users for at least six months. Participants were randomly assigned to three arms: (1) conventional in-person 5A-5R counselling, (2) in-person 5A-5R counselling with mobile phone-based assistance, and (3) a control group. A repeated survey was conducted using descriptive analysis of variables to compare changes in primary and secondary outcomes. Data were analysed using Stata version 17.0.

Results

Among only tobacco smokers, the conventional 5A-5R arm showed the highest quitting rate (10%, $P < 0.01$), whereas among only smokeless tobacco users, the multicomponent arm showed a better outcome with a 38% quitting rate ($P < 0.01$) at endline. For both types of tobacco users, overall, the 5A-5R-based arm showed a higher 14% quitting rate compared to other arms ($P < 0.01$). Among participants who did not quit but reduced the use of tobacco, the 5A-5R-only arm led to a significant reduction in cigarette consumption (mean reduction: 7.4 ± 4.5 sticks/day) and in smokeless tobacco consumption (mean reduction: 5.9 ± 1.4 times less/day) at the endline.

Conclusion

The study found that the 5A-5R counselling model, particularly when delivered in person, was more effective in cessation and reducing tobacco consumption. While the multicomponent arm showed benefits, especially for smokeless tobacco users, the 5A-5R-only counselling arm showed better outcomes for both smoking and smokeless tobacco cessation.

1. INTRODUCTION

Tobacco use, encompassing both smoking and smokeless tobacco, constitutes a significant global health risk, contributing to eight million annual deaths and subsequent disability-adjusted life years (DALYs) loss worldwide ¹. In Bangladesh, 35.3% of adults continue to use tobacco ^{2,3}. Among adults, 43.7% reported being tobacco users in 2018 in Bangladesh, where smokeless tobacco has a prevalence rate of 27.5% ⁴. Men exhibit a higher smoking prevalence than women, but both sexes have almost equal rates of smokeless tobacco use in Bangladesh ⁴.

Smoking cessation attempts without proper methods are often unsuccessful, emphasising the need for effective strategies ⁵. Counselling emerges as a prominent method, contributing significantly to tobacco cessation and

discontinuation of smokeless tobacco use, comprising approximately 13.7% of tobacco cessation and 20.5% of discontinuing smokeless tobacco use⁶. While various approaches exist, a combination of counselling and pharmacotherapy, particularly nicotine replacement therapy (NRT), has proven effective in other contexts^{7,8}. However, the absence of NRT and other pharmacological therapies in Bangladesh makes counselling a preferable method for the local context⁹.

In Bangladesh, the Directorate General of Health Services (DGHS) promotes brief intervention using the World Health Organization (WHO)-recommended 5A-5R counselling technique as part of the implementation of national guidelines for hypertension and diabetes management at the primary healthcare level^{10,11}. This WHO 5A-5R model is concise, comprehensive, and effective in improving attitudes toward smoking¹². Studies have shown that brief intervention counselling can lead to a 15% smoking cessation rate¹³. In this very approach, the 5A (Ask, Advise, Assess, Assist, and Arrange) counselling approach applies to those people who want to quit tobacco, and the 5Rs (Relevance, risk, reward, roadblock, repetition) applies to people who are not ready to change their behaviour¹⁴. Several cluster randomized trials, especially on 5A-based counselling, have been conducted globally, which have demonstrated the effectiveness of this approach on tobacco quitting^{15,16}. However, intervention studies evaluating the 5A-5R-based counselling approach in the South Asian context are scarce¹⁷. Additionally, a systematic review demonstrated that mobile phone-based calls play a crucial role in tobacco cessation, with text messages being more acceptable than application-based interventions¹⁸. Studies conducted in India, Hong Kong, and Vietnam have revealed that the effectiveness of mobile-based interventions in tobacco cessation can be considered as an alternative and cost-effective pathway for smoking cessation^{19–21}. Combining in-person counselling with mobile phone follow-ups has demonstrated a more sustained effect on tobacco cessation than counselling alone^{22,23}. A comprehensive tobacco cessation counselling service using a 5A-5R-based approach coupled with mobile phone follow-up can be effective in reducing tobacco consumption prevalence and can be impactful. However, there is no prior study evaluating such an approach globally. Therefore, this study aims to assess whether phone-assisted culturally appropriate 5A-5R counselling services can enhance the tobacco quitting rate or reduce tobacco consumption among adults in union-level primary health care (PHC) settings in Bangladesh.

2. MATERIAL AND METHODS

2.1 Study design

A small-scale intervention study was used to evaluate the effectiveness of 5A-5R counselling services for tobacco cessation with or without mobile phones in primary health care settings in rural areas of Bangladesh. We chose three unions of Birganj Upazila, which is a sub-district of Dinajpur district in Bangladesh. The project duration was 9 months.

2.2 Study site and study population

The study was conducted in three community clinics (CCs) and their catchment communities across 3 Unions (Satair, Mohonpur, and Shatagram) in Dinajpur, a border-based district in Bangladesh. This small-scale intervention study included men and women aged 18 and above. Mohonpur was allocated for providing a conventional 5A-5R-based counselling service, Shatagram was allocated for delivering mobile phone-assisted enhanced 5A-5R-based counselling service, and Satair was the control group for following usual care without introducing any structured 5A-5R-based counselling service for tobacco cessation (Fig. 2).

2.3 The selection process of the respondents for the study

We deployed 3 Community Health Workers (CHWs) in 3 selected unions to make home visits within the catchment areas to reach all adults, irrespective of sex, who were current tobacco consumers. They initially gave some information about the harmful effects of consuming tobacco products and introduced the 5A-5R-based counselling service at respective CCs and also invited them to attend the 5A-5R-based counselling session in the selected CCs (in the intervention arm). Interested participants have come to the CCs and, with informed consent, have been enrolled in the study to receive the intervention designed for each CC for each selected union.

2.4 Randomization procedure: We used a computer-based approach for selecting the control and intervention unions and also to identify one designated CC from 3 CCs in each arm (2 for the intervention arm and 1 for the control arm). Neither the respondents nor the investigators were blind to the CC allocation; however, the outcome assessors (data analysts) were unaware of the arm allocation.

2.5 Description of Interventions

For intervention delivery, in the Multicomponent arm, we have provided 5A-5R-based counseling service with BCC material (leaflet) delivery with added weekly mobile phone-based calls and texts. We delivered one weekly mobile phone call and one behavioural change text message to facilitate tobacco quitting and ensure remote ongoing support in the multicomponent arm. However, the 5A-5R arm received only in-person 5A-5R-based counseling service with BCC material (leaflet). While implementing this intervention, we ensured to include a study site where no other behavioural or any related national program was going on.

5A-5R-based counseling approach: The 5As (Ask, Advise, Assess, Assist, Arrange) summarize all the activities that a healthcare provider can undertake to help tobacco users within 3–5 minutes in a primary care setting (Fig 1). This model can guide healthcare providers through the appropriate process of counselling tobacco users who are ready to quit and delivering cessation advice ¹¹.

Behavioural Change Communication (BCC) Materials and Mobile phone-based remote support: We have developed BCC materials and confirmed that the materials were acceptable culturally and according to the Bangladesh Government's Tobacco Control Policy and the World Health Organization ²⁴. We have followed the guidelines of the National Tobacco Control Cell (NTCC) ²⁵ and the WHO tobacco control program, and also consulted with other organizations working with tobacco cessation, such as the National Heart Foundation, Cancer Society, and so on. BCC material contained information related to types of tobacco, health hazards of tobacco use, the importance of quitting tobacco, and how to quit tobacco. Additionally, to have other health benefits, we have included some motivational messages for increasing physical activity and fruit and vegetable intake and delivered them to the designated participants through mobile-based text messages.

Control arm

We have selected one CC as control, ensuring a geographical boundary and a certain distance; so, there was minimal chance of contamination. The control arm received no intervention, only usual care. If someone reported that they were consuming tobacco, the CHCP advised them to quit without any structured support. However, after completing the study (after 2 months of study completion), considering the ethical concern, we delivered all BCC materials/leaflets to the Community Health Care Providers (CHCPs) of the control area to deliver these educational materials to the selected study (control) participants to make sure we did not deprive them of the intervention materials after the study completion.

Preparation for intervention delivery:

Feasibility check of the intervention by the CHCPs: According to the national protocol, the 5A-5R-based counseling approach for tobacco quitting usually does not take more than 3-5 minutes. In our study, we have seen the same, though initially the CHCPs took around 7-10 minutes; with frequent practice, they could finally make it within 5 minutes. Therefore, according to the experience of the CHCPs, it is feasible to deliver the intervention with their designated daily work schedule.

Training of the CHCPs: We followed the 5A-5R-based counselling protocol recommended by the WHO Package of Essential Non-communicable Disease Interventions (WHO PEN) for primary health care and the national protocol for the management of diabetes and hypertension to train the CHCPs ^{10,11}.

2.6 Expected outcomes

The primary outcomes we assessed through the research were the proportion of participants with a history of current tobacco use who have quit or reduced their tobacco intake in any form. Secondary outcomes include mean changes in the frequency of smoking and smokeless tobacco consumption per day, and mean changes in the consumption of a number of cigarettes/bidis per day, and changes in knowledge and attitude among the respondents.

3. STATISTICAL ANALYSIS

3.1 Sampling and data collection:

The primary outcome of this study is tobacco cessation in any form. We drew inferences about the efficacy of the intervention by comparing the intervention groups with the control group. For our sample size calculation, we considered the tobacco quitting rate among Bangladeshi adults to be 19.5%, with at least a 10% reduction in tobacco consumption in any form. Considering a 5% probability of type I error (95% two-sided confidence interval), 80% power, an intervention-to-control sample ratio of 1:1, and a minimum of 10% increase in tobacco quitting in any form, our estimated sample size was 213 per arm (Fleiss approach with continuity correction). Given that we enrolled participants from the catchment areas of the community clinic (hence considered as a cluster), we also considered the design effect (1.00514) and an inflated sample size and 10% non-response rate; the estimated sample size was 238 respondents in each union; therefore, the total respondents in three unions were 714 respondents (in the control and intervention arms). However, due to time constraints and several losses to follow-up cases, finally, we were able to analyse data from 668 participants (Arm 1, multicomponent arm, total 236 participants; Arm 2, 5A-5R-based arm, total 219 participants; and in the control arm, total 213 participants' data were analysed). Data collection included interviewer-administered questionnaires and counseling. Questionnaires included domains of socio-demographic characteristics, tobacco use history, health behaviour, and knowledge, attitude, and practice about tobacco consumption, etc. Questionnaires were translated into Bangla and piloted in a field, which ensured cultural appropriateness and clarity of questions.

3.2. Statistical approaches

We have carried out quantitative analysis for both baseline and endline data and performed repetitive survey analysis. We have conducted descriptive analysis for the continuous and categorical variables for baseline and endline to compare the proportion of changes in decided primary and secondary outcomes (any reduction or increase). Statistical analysis, such as t-tests for continuous data and chi-square tests for categorical data, was done (depending on the data distribution) to obtain statistically significant change (P Values at <0.050). We have presented data in tables, graphs, and flowcharts in the final submitted reports. All quantitative analyses will be conducted using the statistical software Stata version 17.0 (Stata Corp LLC, College Station, TX, USA).

3.3. Data management, quality, and security

The means of data collection include a mixture of paper-based and electronic patient registration and forms. Electronic patient profiles and follow-up data were automatically synchronized with the server. All data collected were regularly checked for data quality, such as missing data, biases in data entry, logical inconsistencies, digital preference, and measurement drift. All electronic data were encrypted, password-protected, and stored in secure computer networks. Regular assessment of study personnel on the study protocol and standardized procedures was documented. Regular field visits by study investigators provided an opportunity to discuss and solve issues identified with local partners.

The study was approved by the Institutional Review Board (IRB) of BRAC James P. Grant School of Public Health (BRAC JPGSPH), BRAC University. Informed written consent and confidentiality were ensured. Participants, in addition, had the right to withdraw from the study at any time without any prejudice or penalty. Furthermore, participants did not receive any financial incentive or compensation for participating in the study.

RESULTS

Table 1

Differences among sociodemographic characteristics of participants in 3 unions (n = 668) when compared between baseline and end line.

Indicators	Multicomponent Arm (n = 236)			5A-5R Arm (n = 219)			Control Arm (n = 213)		
	Baseline (n = 236)	Endline (n = 236)	p	Baseline (n = 219)	Endline (n = 219)	p	Baseline (n = 213)	Endline (n = 213)	p
Gender									
Female	87 (36.9)	87 (36.9)	---	88 (40.2)	88 (40.2)	---	88 (41.3)	88 (41.3)	---
Male	149 (63.1)	149 (63.1)		131 (59.8)	131 (59.8)		125 (58.7)	125 (58.7)	
Mean age	50.5 (13.0)	50.5 (13.0)	---	48.0 (13.7)	48.0 (13.7)	---	53.2 (13.6)	53.2 (13.6)	---
Marital status									
Currently married	236 (100.0)	236 (100.0)	---	205 (93.6)	198 (90.4)	0.220	186 (87.3)	188 (88.3)	0.770
Others	0 (0.0)	0 (0.0)		14 (6.4)	21 (9.6)		27 (12.7)	25 (11.7)	
Mean household income (monthly)	12261.4 (7865.0)	12113.1 (9159.7)	0.850	13812.8 (4081.4)	16788.1 (4717.2)	< 0.01*	10457.7 (6033.6)	9213.6 (5988.0)	0.063
Educational status									
No formal education	83 (35.2)	83 (35.2)	---	48 (21.9)	48 (21.9)	---	118 (55.4)	118 (55.4)	---
Less than primary	40 (16.9)	40 (16.9)		20 (9.1)	20 (9.1)		54 (25.4)	54 (25.4)	
Primary	42 (17.8)	42 (17.8)		61 (27.9)	61 (27.9)		9 (4.2)	9 (4.2)	
Less than secondary	48 (20.3)	48 (20.3)		61 (27.9)	61 (27.9)		27 (12.7)	27 (12.7)	
Secondary and above	23 (9.7)	23 (9.7)		29 (13.2)	29 (13.2)		5 (2.3)	5 (2.3)	
Occupation									
Employed	113 (47.9)	111 (47.0)	0.990	116 (53.0)	114 (52.1)	0.230	102 (47.9)	111 (52.1)	0.50
Business	28 (11.9)	30 (12.7)		19 (8.7)	22 (10.0)		20 (9.4)	17 (8.0)	
Homemaker	82 (34.7)	80 (33.9)		81 (37.0)	76 (34.7)		63 (29.6)	65 (30.5)	

Note: Data are expressed as mean $\pm$ SD for normally distributed continuous variables or number (percentages) for categorical variables. The number of observations across the categories may not add up to the total given number because of missing data. P = P value; *P = < 0.050

Indicators	Multicomponent Arm (n = 236)			5A-5R Arm (n = 219)			Control Arm (n = 213)		
	Baseline (n = 236)	Endline (n = 236)	p	Baseline (n = 219)	Endline (n = 219)	p	Baseline (n = 213)	Endline (n = 213)	p
Unemployed	12 (5.1)	14 (5.9)	0.180	0 (0.0)	5 (2.3)	0.10	28 (13.1)	19 (8.9)	0.720
Retired/Others	1 (0.4)	1 (0.4)		3 (1.4)	2 (0.9)		0 (0.0)	1 (0.5)	
Wealth index									
Poorest	50 (21.2)	45 (19.1)		70 (32.0)	18 (8.2)		47 (22.1)	40 (18.8)	
Poorer	47 (19.9)	47 (19.9)		31 (14.2)	57 (26.0)		37 (17.4)	47 (22.1)	
Middle	58 (24.6)	42 (17.8)	45 (20.5)	42 (19.2)	45 (21.1)	40 (18.8)			
Richer	36 (15.3)	53 (22.5)	30 (13.7)	58 (26.5)	42 (19.7)	44 (20.7)			
Richest	45 (19.1)	49 (20.8)	43 (19.6)	44 (20.1)	42 (19.7)	42 (19.7)			
Family history of current tobacco consumption									
Yes	225 (95.3)	140 (59.3)	* <0.001	176 (80.4)	124 (56.6)	< 0.01*	182 (85.4)	76 (35.7)	< 0.01*
Relation family member who uses tobacco									
1st degree relative	140 (100.0)	140 (100.0)	---	110 (88.7)	92 (52.3)	---	75 (98.7)	75 (98.7)	---
2nd degree relative	139 (99.3)	139 (99.3)		109 (87.9)	164 (93.2)		54 (71.1)	54 (71.1)	
Distant relative	128 (91.4)	128 (91.4)		113 (91.1)	88 (50.0)		0 (0.0)	0 (0.0)	
Influenced by relatives to use tobacco									
No	64 (45.7)	157 (69.8)	< 0.01*	89 (71.8)	89 (71.8)	1.00	69 (90.8)	69 (90.8)	1.00
Smoke	15 (10.7)	15 (10.7)	---	33 (26.6)	33 (26.6)	---	24 (31.6)	24 (31.6)	---
Smokeless	109 (77.9)	109 (77.9)		69 (55.6)	69 (55.6)		23 (30.3)	23 (30.3)	
Both	16 (11.4)	16 (11.4)		22 (17.7)	22 (17.7)		29 (38.2)	29 (38.2)	
Influenced by friends or peer tobacco users									
No	65 (27.5)	98 (41.5)	< 0.01*	203 (92.7)	54 (24.7)	< 0.01	206 (96.7)	134 (62.9)	< 0.01*

Note: Data are expressed as mean $\pm$ SD for normally distributed continuous variables or number (percentages) for categorical variables. The number of observations across the categories may not add up to the total given number because of missing data. P = P value; *P = < 0.050

Table 1 shows the sociodemographic characteristics of the participants in 3 Arms. Among remarkable sociodemographic characteristics, the mean household income of the participants in the 5A-5R-based arm has significantly increased in comparison to the other two arms ($p < 0.01$) at endline when compared with baseline. Family history of current tobacco consumption also has been significantly reduced in all 3 arms ($p < 0.01$). Again, when asked if the participants were influenced by family members or peers, we have seen a significant change at endline compared to baseline in all 3 arms ($p < 0.01$). Other variables in sociodemographic characteristics showed no significant changes when compared between baseline and end line in each arm.

Figure 3 shows, for smoking tobacco user (with or without history of smokeless tobacco) In the multicomponent arm, the proportion of smoking tobacco users (with or without a history of smokeless tobacco use) declined from 30% to 18% in end line revealing 12% quitting rate ($P < 0.01$); in 5A-5R counseling-only arm, the proportion of smoking tobacco user (with or without a history of smokeless tobacco use) declined from 50% to 27% in end line revealing 23% quitting rate ($P < 0.01$); in control arm only 2% cessation happened (non-significant, $P = 0.690$). In case of smokeless tobacco users with or without smoking tobacco use: In the multicomponent arm, the proportion of smokeless tobacco use declined from 85% to 41% in the end line revealing a 44% quitting rate ($P < 0.01$); in 5A-5R counseling only arm, the proportion of smokeless tobacco user (with or without a history of smoking tobacco use) declined from 67% to 34% in end line revealing 33% quitting rate ($P < 0.01$); in control arm only 18% cessation happened ($P < 0.01$). Again, in case of only smoking tobacco users: the quitting rate in the multivariable arm was 6% (baseline 15% and end line 9%) which was statistically significant ($P < 0.01$), whereas in the 5A-5R Arm, quitting rate among only smokers was 10% (baseline 33% and end line 23%), which was statistically significant ($P < 0.01$), but control arm shows no quitting among the smokers only.

Furthermore, in case of only smokeless tobacco users, the quitting rate in the multivariable arm was 38% (baseline 70% and end line 32%) which was statistically significant ($P < 0.01$), whereas in 5A-5R Arm quitting rate among only smokeless tobacco users was 19% (Baseline 50% and end line 31%, $P < 0.01$), and control arm shows only 3% quitting among the smokeless tobacco users only (non-significant $P = 0.920$). The control arm showed only a 3% quitting rate, which was not statistically significant ($P = 0.920$). Lastly, in the case of current users of both types of tobacco, the multicomponent arm showed a 5% quitting rate for both smoking and smokeless tobacco users combined (baseline 14%, endline 9%) ($P < 0.01$). The 5A-5R arm showed a 14% quitting rate for both types of tobacco use (baseline 17%, endline 3%) ($P < 0.01$). The control arm showed only a 2% quitting rate (Baseline 6%, Endline 4%), which was not statistically significant ($P = 0.50$).

Table 2

Reduction in mean smoking and smokeless tobacco use consumption in 3 selected unions when compared between baseline and endline.

Indicators	Multicomponent Arm (n = 236)		5A-5R Arm (n = 219)		Control Arm (n = 213)	
	Mean reduction	P	Mean Reduction	P	Mean Reduction	P
Smoking tobacco						
Manufactured Cigarettes (sticks/day)	0.6 ± 0.4	0.250	7.4 ± 4.5	< 0.01*	0.8 ± 2.2	0.340
Bidis (sticks/day)	0.3 ± 0.9	0.401	2.0 ± 1.5	0.054	4.7 ± 1.7	0.050*
Smokeless tobacco						
Betel quid with Zarda, Zarda only, or Zarda with Supari (times/day)	0.3 ± 0.2	0.450	5.9 ± 1.4	< 0.01*	1.3 ± 1.9	0.054
Note: Data are expressed in mean ± standard deviation (SD) for indicating reduction in endline compared to baseline in continuous variables; P = P value; *P = < 0.050						

In Table 2, for tobacco smoking, a significant reduction in manufactured cigarette use was reported only in the 5A-5R-based arm (7.4 ± 4.5 sticks/day, $p < 0.01$) compared with the multicomponent and control arms. Similarly, in terms of smokeless tobacco, a significant reduction in the use of smokeless tobacco (betel quid with zarda, zarda only, or zarda with supari) was reported only in the 5A-5R-based arm (5.9 ± 1.4 times/day, $p < 0.01$) compared with the multicomponent arm and control arm.

Table 3

Increase in knowledge, attitude, and practice among respondents in 3 selected unions

Indicators	Multicomponent Arm (n = 236)			5A-5R Arm (n = 219)			Control Arm (n = 213)		
	Baseline	End line	P	Baseline	End line	P	Baseline	End line	P
Believe cigarettes are addictive									
Yes	74 (31.4)	87 (36.9)	< 0.01*	124 (56.6)	203 (92.7)	< 0.01*	208 (97.7)	191 (89.7)	< 0.01*
Believe smokeless tobacco is addictive									
Yes	139 (58.9)	179 (75.0)	< 0.01*	180 (82.2)	206 (94.1)	< 0.01*	198 (93.0)	209 (98.0)	0.054
Note: Data are expressed as numbers (percentages) for categorical variables. The number of observations across the categories may not add up to the total given number because of missing data. P = P value; *P = < 0.050									

In Table 3, it has been shown that knowledge about tobacco addiction and harms increased significantly in all three arms. A significant increase was observed in the belief that cigarettes are addictive in all arms ($P < 0.01$), and both the multicomponent and 5A-5R arms showed a significant increase in the belief that smokeless tobacco is harmful ($P < 0.01$). However, the control arm showed only borderline significance. Other changes in knowledge and practice showed minimal or no significant difference between the arms at the end of the study, therefore not shown in the table to make it simple, with only significant results.

DISCUSSION

In this study conducted in rural primary healthcare settings in Bangladesh, both structured 5A–5R counselling and its extension with mobile phone–based support were effective in achieving tobacco cessation; however, their impact was not uniform across user groups. A distinct pattern emerged, where counselling alone produced stronger effects for smoking cessation, while the addition of mobile phone-based support obtained greater benefits among smokeless tobacco users only. This divergence is reflected in the observed outcomes, where smoking cessation was higher in the 5A–5R arm (23% vs. 12%), whereas smokeless tobacco cessation was more noticeable in the multicomponent arm (44% vs. 33%). A previous study conducted among Chinese male smokers attending a smoking cessation clinic showed that supplementing face-to-face counselling with structured telephone follow-up significantly improved smoking cessation outcomes²³. Although the study population differed from ours, it supports the role of continued behavioral support in tobacco cessation. In contrast, our findings suggest that the added benefit of follow-up may be greater among smokeless tobacco users than smokers. In this study, the effectiveness of structured counselling observed here signifies the central role of behavioral interventions in tobacco cessation. In settings where access to pharmacotherapy is limited, structured approaches such as 5A–5R remain the most feasible strategy to initiate quitting behavior, as the earlier evidence from primary care–based interventions has reported, saying that structured counselling increases quit attempts and abstinence compared with minimal or no intervention¹². Within the Bangladeshi context, where a large proportion of users attempt to quit without formal support⁶, the present findings highlight the value of integrating structured counselling into routine healthcare delivery.

This study also reported a significant reduction in cigarette consumption observed exclusively in the 5A–5R arm, indicating that structured counselling is particularly effective in modifying smoking behavior even when complete cessation is not achieved. However, the added value of mobile follow-up was not uniform, indicating that reinforcement mechanisms may operate differently depending on the type of tobacco use. A systematic analysis of data from 127 countries reveals that smokeless tobacco use is highly prevalent in Bangladesh and other South Asian settings, where many products are culturally accepted, socially used, and pharmacologically addictive because of nicotine content and product characteristics that may increase dependence²⁶, therefore, in many cases in this study, reduction in smoking and smokeless tobacco was achieved after intervention but not complete cessation²⁷.

In the present study, the substantially higher cessation observed among smokeless tobacco users in the multicomponent arm compared with the 5A–5R arm suggests that periodic follow-up may have functioned as a behavioral anchor by maintaining motivation, addressing withdrawal challenges, and reinforcing quitting intentions over time. Although previous studies have shown that sustained engagement through mobile or tele-counselling can support smoking cessation by providing ongoing behavioral reinforcement^{18,19,28}, whether this mechanism similarly benefits smokeless tobacco users remains uncertain. The present findings are broadly in line with earlier cessation studies showing that follow-up support can strengthen the effect of counselling. In the Beijing smoking cessation clinic study, smokers who received face-to-face counselling with telephone follow-up achieved better abstinence outcomes than those who received counselling alone²³. A similar pattern was reported in the vascular disease hospitalization trial by Pleym et al., where motivational counselling linked with proactive community-based follow-up improved smoking abstinence at later follow-up points²⁹. However, our findings add an important nuance: mobile follow-up did not appear to add the same benefit for smokers as it did for smokeless tobacco users. This suggests that while structured 5A–5R counselling may be sufficient to trigger quitting among many smokers, smokeless tobacco users may benefit more from repeated reinforcement over time. This subgroup-specific pattern should be interpreted cautiously and explored further in future studies. At the same time, a more intensive delivery format does not always guarantee better cessation outcomes. In the video counselling smoking cessation trial, video-based counselling showed some short-term benefit compared with printed materials, but it did not outperform telephone

counselling or control for 13-month abstinence³⁰. This finding is relevant to the present study because mobile follow-up did not add the same level of benefit for smokers as it did for smokeless tobacco users. A possible explanation is that, for many smokers, the direct and structured nature of 5A–5R counselling may be enough to initiate quitting, whereas smokeless tobacco users may need more repeated reinforcement. However, this interpretation should remain cautious, as the difference between smoking and smokeless tobacco users requires further study.

A significant increase was observed in the belief that cigarettes and smokeless tobacco are harmful in this particular study, which indicates such an intervention study also generates general awareness among people, as is also evident in earlier studies conducted among patient groups³¹.

Globally, tobacco remains a major contributor to deaths and DALYs, especially through cardiovascular disease, cancers, and chronic respiratory diseases¹. In Bangladesh, NCDs account for a large share of total mortality, and adult tobacco smoking remains an important risk factor³². Within this context, integrating structured tobacco cessation counselling into primary healthcare, with selective use of mobile-based follow-up for users who may need additional reinforcement, may offer a practical and scalable way to strengthen tobacco control efforts.

Several limitations should be considered when interpreting these findings. First, cessation outcomes were self-reported, which may introduce reporting bias. Second, the follow-up duration may not fully capture long-term relapse patterns. Third, variability in engagement with mobile follow-up could not be quantified, limiting assessment of dose–response relationships. Finally, as the study was conducted in rural settings, the findings may not be directly generalizable to urban populations or different healthcare contexts. However, this study has generated evidence supporting the effectiveness of the WHO-recommended 5A-5R-based in-person counselling for tobacco cessation in a community health setting globally.

CONCLUSION

In conclusion, our study provides strong evidence supporting the effectiveness of the WHO-recommended 5A-5R-based in-person counseling for tobacco cessation in a community health setting. The intervention demonstrated significant tobacco quitting rates, particularly 5A-5R-based counseling, which significantly improved tobacco cessation outcomes, with a notable 14% quitting rate for both smoking and smokeless tobacco users combined. Among smokeless tobacco users, a 38% quitting rate was reported in the multicomponent arm; however, among smoking tobacco users, the 5A-5R counseling-only arm outperformed the multicomponent arm, with a 10% quitting rate. Further research with broader geographical coverage and longer follow-up periods is necessary to assess the sustained impact of these interventions and to refine strategies for tobacco cessation across diverse populations. The promising results from this study advocate for the widespread adoption of 5A-5R-based counseling as a primary tool for tobacco cessation in Bangladesh and similar settings worldwide.

Declarations

Conflict of Interest: The authors have no conflict of interest to declare

AUTHOR CONTRIBUTION

S.A, A.A.H, T.S, H.M.M, T.R, M.K.M: Conceptualization, data curation, investigation, methodology, project administration, visualization; S.A: writing – original draft (lead); T.S, Z.Z.S, T.R: data management, analysis; A.A.H, E.H, T.S, T.R: writing – writing and editing (supporting). All authors reviewed the manuscript.

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Ethical Approval and accordance

The study received ethical approval from the Institutional Review Board (IRB) of the BRAC James P Grant School of Public Health, BRAC University (IRB reference number: IRB-2024-IS-16) following the ethical principles guiding human research, in accordance with the Declaration of Helsinki.

Consent to participate

Written informed consent was obtained from all participants. All participants were aware of the study objectives, the right to withdraw from the study at any time, and the maintenance of anonymity and confidentiality.

Conflicts of interest

The authors have no competing interests to declare.

Data availability statement

The data that supported the findings of this study are available from the corresponding author upon reasonable request.

Code availability statement

The Stata code used for statistical analyses is available from the corresponding author upon reasonable request.

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Consent for publication

Not applicable.

Clinical trial Registration details: Clinical Trial Registry at ClinicalTrials.gov, trial registration number: NCT06501209 (<https://clinicaltrials.gov/study/NCT06501209>), Date of registration: 15th July, 2024

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Figures

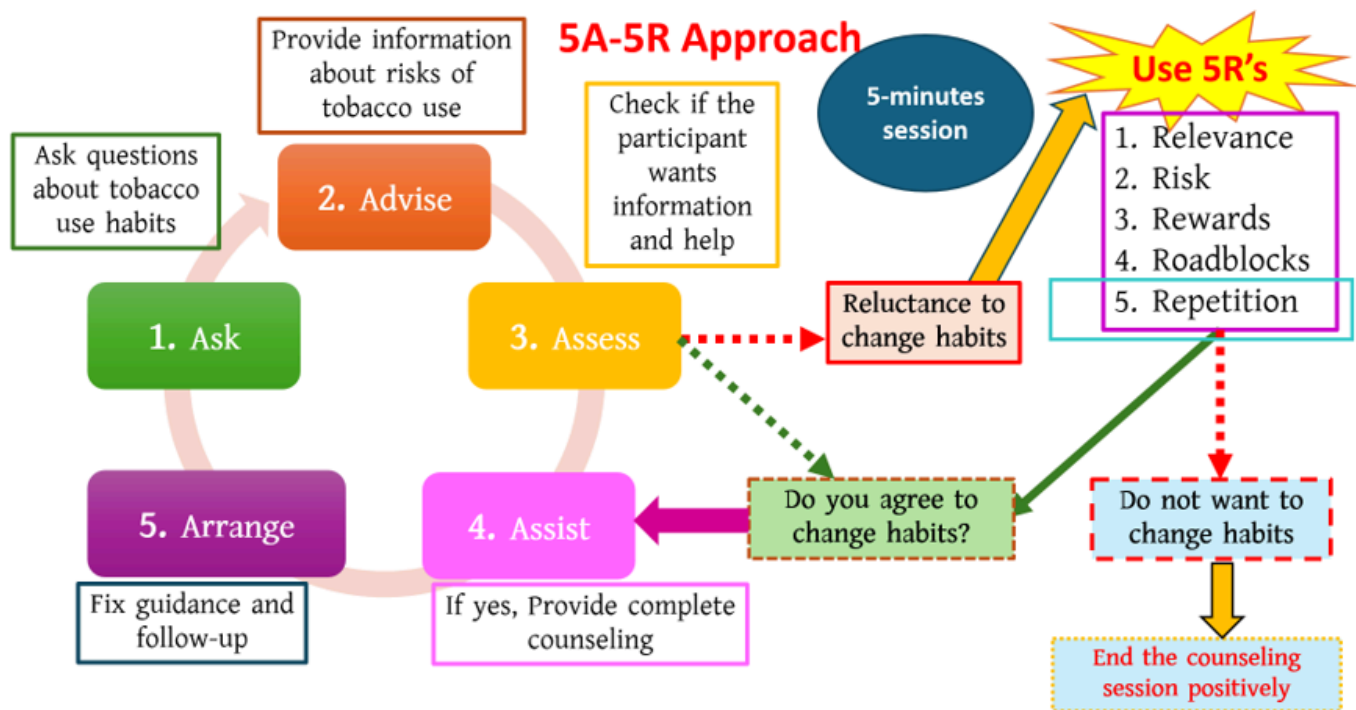
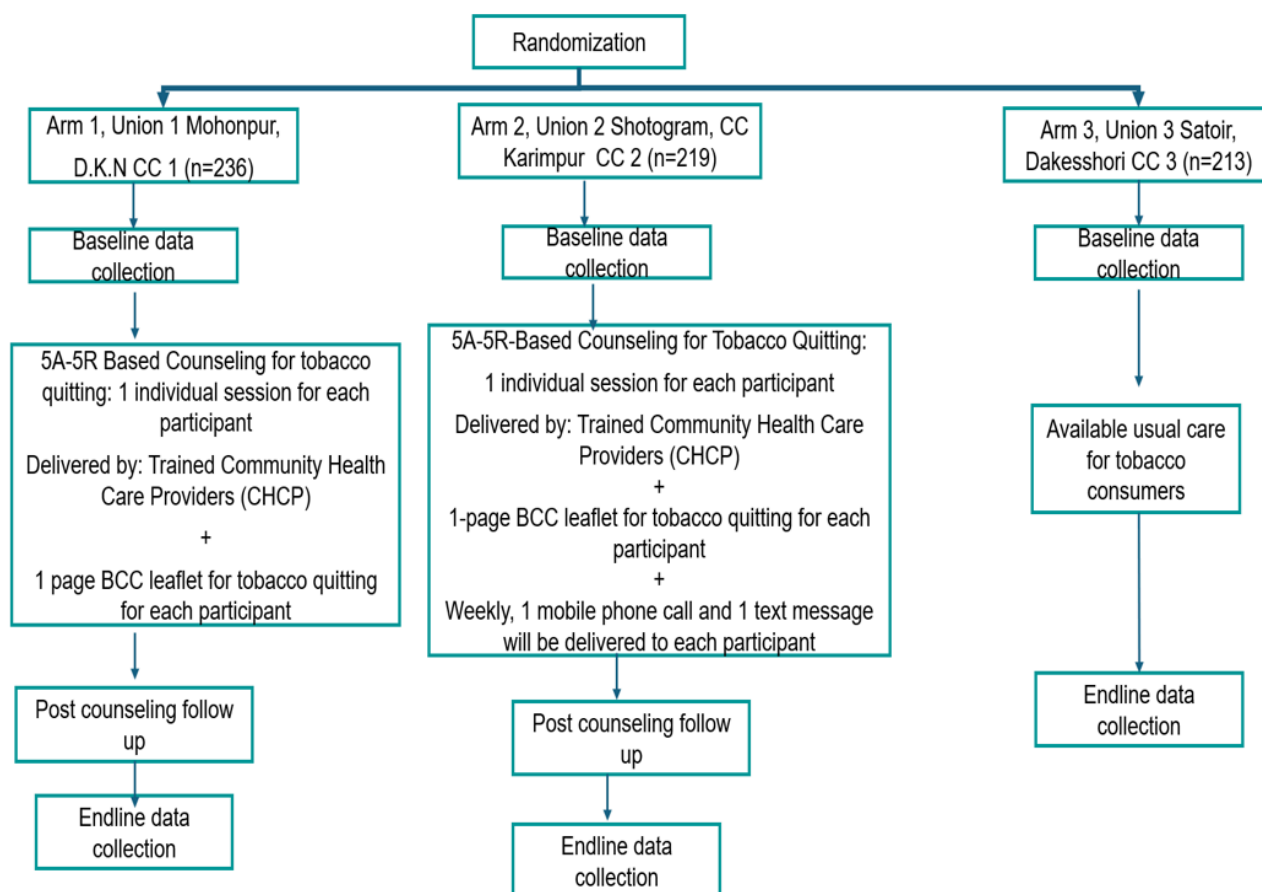


Figure 1

WHO 5A-5R Approach for tobacco quitting



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Figure 2

Intervention flowchart among the three designated arms in Mohonpur (Arm 1: 5A-5R Arm), Shatagram (Arm 2: Multicomponent Arm), and Satair (Arm 3: Control Arm)

Arrange facilitators for the training: A team of trainers from BRAC JPGSPH was selected based on availability and expertise to deliver the training sessions for this training program. Trainers had relevant Training of Trainers (ToT) to conduct this training. During the training, the facilitators adapted the contents based on the participants' responses, and the trainers supported each other during the sessions to engage the participants appropriately. The training participants were asked to evaluate each of the sessions using a structured evaluation form. In the end, participants were able to evaluate the quality of the training in general and provide feedback for further improvement.

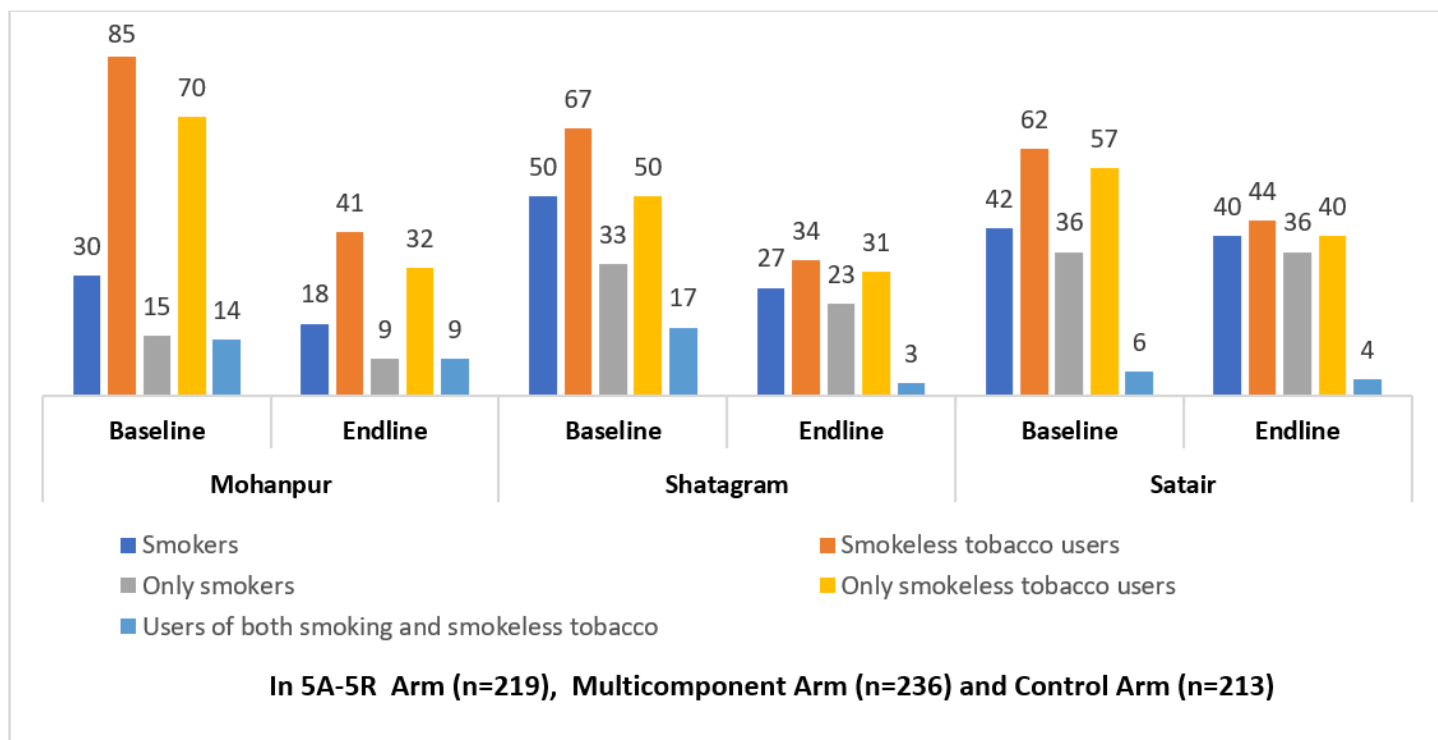


Figure 3

The proportional tobacco quitting achieved through this intervention study in 5 major outcomes in 3 selected unions of Birganj Upazila in Dinajpur District (n=668)

Legend: Fig 3 shows the proportional change of tobacco use (tobacco quitting) among the participants in 3 Arms (Multicomponent arm; 5A-5R-based arm and the control arm with usual care) at endline compared to baseline.

Supplementary Files

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