

Training Tobacco Retailers and Community-Based Organisation Workers to Deliver Brief Smoking Cessation Interventions: A Multi-City Paired Pre-Post Study in Pakistan

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Research Article

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Abstract

Background

Tobacco use remains one of the leading preventable causes of morbidity and mortality worldwide. In Pakistan, limited access to evidence-based smoking-cessation services highlights the need for innovative community-based approaches. Tobacco retailers and community-based organisation (CBO) workers interact regularly with smokers and may represent an underutilised resource for delivering smoking-cessation information. This study assessed pre- to post-training changes in knowledge and perceptions among tobacco retailers and CBO workers in Pakistan.

Methods

A multi-centre, one-group paired pre–post quasi-experimental study was conducted in Abbottabad, Karachi, Lahore, Peshawar, Islamabad and Rawalpindi, Pakistan. A total of 279 participants (139 tobacco retailers and 140 CBO workers) completed questionnaires immediately before and after training. Paired binary outcomes were analysed using two-sided exact McNemar tests. Follow-up data were obtained from 113 participants (56 retailers and 57 CBO workers) approximately three months after training.

Results

All 139 tobacco retailers and 140 CBO workers were matched between pre- and post-training questionnaires. Awareness of modern smoking-cessation methods increased from 30.2% to 95.0% among retailers and from 18.6% to 96.4% among CBO workers (both exact McNemar $p < 0.001$). Correct recognition that nicotine was not the direct cause of the diseases listed in the questionnaire increased from 16.5% to 79.1% among retailers ($n = 139$) and from 8.8% to 72.3% among CBO workers ($n = 137$; both $p < 0.001$). At follow-up, 53/56 retailers (94.6%) and 55/57 CBO workers (96.5%) reported discussing quitting with smokers; these outcomes were self-reported and were not independently verified.

Conclusions

The training was associated with improvements in smoking-cessation knowledge and perceptions among tobacco retailers and CBO workers. Training community-facing groups may be a feasible way to complement smoking-cessation education in resource-constrained settings. Controlled studies are required to assess knowledge retention, behavioural outcomes, and any effect on smoking cessation.

Introduction

Tobacco use remains one of the leading preventable causes of morbidity and premature mortality worldwide. Tobacco use causes millions of deaths annually, including deaths among non-smokers exposed to second-hand smoke, and imposes substantial healthcare and productivity costs [1]. In Pakistan, tobacco

use contributes to cardiovascular and chronic respiratory diseases, cancer, premature mortality and substantial economic losses [2, 3].

Despite decades of tobacco-control efforts, smoking cessation remains a significant public-health challenge. Nicotine dependence makes quitting difficult, and clinical guidance recommends combining behavioural support with evidence-based pharmacological treatments, including nicotine replacement therapy, to improve cessation outcomes [4, 5]. Consequently, there is an ongoing need to identify scalable community-based approaches that may expand the reach of smoking-cessation support, particularly where specialised services are scarce.

Smoking cessation remains the preferred strategy for reducing the health risks of tobacco use, and complete abstinence provides the greatest health benefit. However, many smokers experience repeated unsuccessful quit attempts despite behavioural support and approved pharmacotherapies [4]. Tobacco harm reduction has been proposed as a complementary strategy for adults who smoke and are unable or unwilling to quit using conventional approaches, including those who have made unsuccessful quit attempts. This approach seeks to reduce exposure to combustion-generated toxicants through complete substitution with lower-risk non-combustible nicotine products where appropriate, while recognising that such products are not risk-free and are not intended for non-smokers or young people [6, 7].

Community-based approaches may expand access to smoking-cessation support beyond conventional healthcare settings. Tobacco retailers interact regularly with adult smokers at the point of purchase, while CBO workers are trusted community members who often participate in health-promotion activities. A systematic review found that community health-worker involvement may support smoking cessation, although the evidence remains limited [8]. Very brief advice may also be incorporated into routine interactions and has shown benefit in clinical settings [9].

Despite growing evidence supporting community-based smoking-cessation interventions, important knowledge gaps remain. Most studies have focused on healthcare professionals or community health workers individually, with limited evidence on training multiple community-facing groups simultaneously in routine non-clinical settings [8, 9]. In Pakistan, some evidence exists on smoking-cessation interventions involving community-based and frontline health workers; however, we found no published evidence specifically evaluating tobacco retailers in this role, or multi-city programmes that train both tobacco retailers and CBO workers [8, 10, 11].

This study aimed to assess pre- to post-training changes associated with a standardised training programme delivered to tobacco retailers and community-based organisation (CBO) workers across six cities in Pakistan. It assessed knowledge and perceptions regarding smoking cessation, nicotine, and tobacco harm reduction; intended smoking-cessation recommendations; and self-reported community outreach activities at follow-up.

Methods

Study Design

This quasi-experimental study employed a one-group paired pre–post design to assess changes following a standardised smoking-cessation training programme delivered to tobacco retailers and CBO workers across six cities in Pakistan. Participants completed structured pre- and post-training questionnaires. A follow-up assessment was conducted approximately three months after training to describe participants' self-reported community outreach activities and reported engagement with adult smokers.

Study Setting and Participants

The study was conducted in Abbottabad, Karachi, Lahore, Peshawar, Islamabad, and Rawalpindi. Tobacco retailers operating established retail outlets and community-based organisation (CBO) workers involved in community outreach and health promotion activities were recruited through local partner organisations and community networks using purposive sampling. A total of 279 participants were enrolled, comprising 139 tobacco retailers and 140 CBO workers. Participant recruitment was distributed across all six cities; city-specific numbers are presented in Table 1. Participants who completed both the pre-training and post-training assessments were included in the paired analyses. Approximately three months after the training, follow-up data were obtained from 113 participants (56 retailers and 57 CBO workers) to evaluate post-training outreach activities.

Training Intervention

The intervention comprised 12 face-to-face, one-day workshops conducted from April to October 2025 across the six participating cities, with approximately 25 participants per workshop. Workshops were delivered by public-health specialists and tobacco-control experts with more than 10 years of experience in tobacco control, cessation, public-health research and programme implementation. A common curriculum, presentation materials, facilitator guide, and participant manual were used across workshops; attendance was recorded and post-training questionnaires were completed immediately after each workshop.

The training combined interactive lectures, facilitated discussions, case-based learning, and question-and-answer sessions. Core topics included the health effects of tobacco smoking, nicotine addiction, evidence-based smoking cessation strategies, behavioural counselling techniques, nicotine replacement therapy (NRT), tobacco harm reduction concepts, effective communication with adult smokers, and appropriate referral pathways for smoking cessation support. Participants were encouraged to discuss practical scenarios commonly encountered during interactions with smokers to enhance their confidence in delivering brief smoking cessation advice within their respective community settings.

The standardised training curriculum is provided in Additional file 1.

Data Collection

Data were collected using structured questionnaires administered immediately before and after the training programme. The questionnaires assessed demographics, knowledge regarding tobacco use and nicotine,

perceptions of smoking cessation and tobacco harm reduction, and intended smoking-cessation recommendations. Approximately three months after training, follow-up data were obtained from 113 participants, comprising 56 tobacco retailers and 57 CBO workers. Participants reported whether they had engaged adult smokers in discussions related to smoking cessation and harm reduction within their communities. These follow-up findings were self-reported and were not independently verified.

Outcome Measures

The primary outcomes were changes in participant knowledge and perceptions relating to tobacco use, nicotine, smoking cessation, and tobacco harm reduction following training. Secondary outcomes included changes in intended smoking cessation recommendations and participant-reported community outreach activities measured during the three-month follow-up assessment.

Statistical Analysis

Participant characteristics were summarised using frequencies and percentages. Before statistical analysis, pre- and post-training records were linked within city using the direct identifiers available in the source files. Among retailers, 135 pairs matched on normalised name and mobile number, three on unique normalised name and city after mobile-entry discrepancies, and one on unique mobile number and city after a name-entry discrepancy. All 140 CBO pairs matched on normalised participant name; mobile number additionally corroborated 139 pairs. No ambiguous match remained. Direct identifiers were used only for linkage and were not included in analytical models or reported outputs. Binary outcomes were analysed using two-sided exact McNemar tests. Missing responses were excluded only from the affected outcome. Paired risk differences were calculated as the mean within-pair post-minus-pre difference and reported in percentage points with descriptive normal-approximation 95% confidence intervals. No confidence interval was estimated for the retailer second-hand-smoke item because there were no discordant pairs. Recommendation variables with non-equivalent questions or sparse transitions were analysed descriptively. No adjustment for multiple comparisons was applied; individual item-level analyses were considered exploratory.

Follow-up data were summarised using frequencies, percentages and cross-tabulations. Exploratory analyses of participant-reported agreement categories, including regression diagnostics and sensitivity analyses, are provided in Additional file 2 and were not treated as evidence of intervention effectiveness. Primary paired analyses were conducted in Stata 18 (StataCorp, College Station, TX, USA), and reproducibility checks used Python 3.12.13 with pandas 2.2.3 and NumPy 2.3.5. Statistical significance was defined as a two-sided $p < 0.05$.

Questionnaire Development

Group-specific pre- and post-training questionnaires were developed for this study by the research team working at QBAL to assess participants' knowledge, perceptions, and intended smoking-cessation

practices. The retailer and community-based organisation (CBO) worker versions reflected their different community roles while maintaining a common set of core questions that enabled comparison between participant groups.

The questionnaires included items on participant demographics, smoking status, knowledge of smoking-related diseases, second-hand smoke, nicotine addiction, misconceptions regarding nicotine, awareness of evidence-based smoking cessation methods, nicotine replacement therapy (NRT), tobacco harm reduction (THR), and attitudes towards smoking cessation recommendations. The retailer questionnaire additionally included occupation-specific questions related to customer interactions and smoking cessation advice.

The questionnaires were prepared in both **English and Urdu**. Participants selected English or Urdu questionnaire according to their preference. Facilitators were available to clarify procedural instructions without suggesting responses.

Questionnaire review and pilot testing

The questionnaires were reviewed prior to implementation by **five independent experts** with doctoral qualifications and expertise in tobacco control and public health to assess their clarity, relevance, and content. Based on their feedback, minor revisions were made to improve wording and clarity before field implementation.

The revised questionnaires were subsequently pilot tested among 10 tobacco retailers and 10 community-based organisation (CBO) workers who were not included in the final study sample. The pilot study assessed the comprehensibility, acceptability, and administration of the questionnaires. Minor modifications were incorporated before commencement of the main study.

AI-assisted support. OpenAI ChatGPT and Codex were used for language editing, code generation, reproducibility checking and assistance with the statistical workflow. All numerical results used in the manuscript were verified against the source data and saved analytical outputs. The author reviewed the final manuscript and accepts full responsibility for its content, interpretation and conclusions.

Results

Participant characteristics and analytic sample

A total of 279 participants completed both the pre- and post-training assessments, comprising 139 tobacco retailers and 140 community-based organisation (CBO) workers. All records were linked across time. Most tobacco retailers were aged 25–44 years (84/139, 60.4%), as were 66/140 (47.1%) CBO workers. All tobacco retailers were male; among CBO workers, 93/140 (66.4%) were male, 45/140 (32.1%) were female, and 2/140 (1.4%) were transgender. Baseline characteristics are presented in Table 1.

Table 1
Baseline characteristics of study participants

Characteristic	Tobacco retailers (n = 139)	CBO workers (n = 140)	Total (N = 279)
Age group, years			
18–24	32 (23.0)	20 (14.3)	52 (18.6)
25–44	84 (60.4)	66 (47.1)	150 (53.8)
45–54	17 (12.2)	34 (24.3)	51 (18.3)
55 and above	6 (4.3)	20 (14.3)	26 (9.3)
Gender			
Female	0 (0.0)	45 (32.1)	45 (16.1)
Male	139 (100.0)	93 (66.4)	232 (83.2)
Transgender	0 (0.0)	2 (1.4)	2 (0.7)
City			
Abbottabad	25 (18.0)	24 (17.1)	49 (17.6)
Peshawar	25 (18.0)	24 (17.1)	49 (17.6)
Karachi	26 (18.7)	22 (15.7)	48 (17.2)
Lahore	23 (16.5)	22 (15.7)	45 (16.1)
Islamabad	20 (14.4)	23 (16.4)	43 (15.4)
Rawalpindi	20 (14.4)	25 (17.9)	45 (16.1)
<i>Note. Values are n (%). Baseline characteristics were derived from pre-training records only. City codes were decoded separately in the retailer and CBO datasets using their respective Stata value labels.</i>			

Pre- and post-training knowledge outcomes

Awareness of modern smoking-cessation methods increased from 42/139 (30.2%) to 132/139 (95.0%) among tobacco retailers and from 26/140 (18.6%) to 135/140 (96.4%) among CBO workers (both exact $p < 0.001$). Identification of nicotine as the addictive substance increased significantly among CBO workers, from 99/140 (70.7%) to 111/140 (79.3%; $p = 0.017$), but the corresponding change among tobacco retailers, from 108/139 (77.7%) to 112/139 (80.6%), was not statistically significant ($p = 0.219$). Recognition that second-hand smoke is harmful was high at baseline and did not change significantly in either group (Table 2).

Table 2
Paired changes in smoking-cessation knowledge

Outcome	Group	n	Pre n/N (%)	Post n/N (%)	Change, pp (95% CI)	Improved	Worsened	p
Second-hand smoke harmful	Tobacco retailers	139	132/139 (95.0)	132/139 (95.0)	0.0; CI not estimated*	0	0	1.000
	CBO workers	140	134/140 (95.7)	136/140 (97.1)	1.4 (-2.5–5.4)	5	3	0.727
Nicotine identified as addictive substance	Tobacco retailers	139	108/139 (77.7)	112/139 (80.6)	2.9 (-0.6–6.3)	5	1	0.219
	CBO workers	140	99/140 (70.7)	111/140 (79.3)	8.6 (2.1–15.0)	17	5	0.017
Aware of modern cessation methods	Tobacco retailers	139	42/139 (30.2)	132/139 (95.0)	64.7 (56.8–72.7)	90	0	< 0.001
	CBO workers	140	26/140 (18.6)	135/140 (96.4)	77.9 (71.0–84.8)	109	0	< 0.001
Note. Two-sided exact McNemar tests were used for paired binary outcomes. Denominators are outcome specific. Paired change is the post-minus-pre percentage-point difference; 95% CIs are descriptive normal-approximation intervals. *CI was not estimated for the retailer second-hand-smoke item because no discordant pairs were observed.								

Nicotine and harm perceptions

The proportion selecting “No” when asked whether nicotine causes the diseases listed in the questionnaire increased from 23/139 (16.5%) to 110/139 (79.1%) among tobacco retailers and from 12/137 (8.8%) to 99/137 (72.3%) among CBO workers (both exact $p < 0.001$). Selection of the reduced-harm response used in the questionnaire increased from 48/139 (34.5%) to 131/139 (94.2%) among tobacco retailers and from 34/140 (24.3%) to 132/140 (94.3%) among CBO workers (both $p < 0.001$; Table 3).

Table 3
Paired changes in nicotine and harm perceptions

Outcome	Group	n	Pre n/N (%)	Post n/N (%)	Change, pp (95% CI)	Improved	Worsened	p
Nicotine-disease item: selected "No"	Tobacco retailers	139	23/139 (16.5)	110/139 (79.1)	62.6 (53.8–71.4)	90	3	< 0.001
	CBO workers	137	12/137 (8.8)	99/137 (72.3)	63.5 (55.2–71.8)	88	1	< 0.001
Reduced-harm response selected	Tobacco retailers	139	48/139 (34.5)	131/139 (94.2)	59.7 (50.4–69.0)	88	5	< 0.001
	CBO workers	140	34/140 (24.3)	132/140 (94.3)	70.0 (62.1–77.9)	99	1	< 0.001

Note. Two-sided exact McNemar tests were used for paired binary outcomes. Denominators are outcome-specific. Paired change is the post-minus-pre percentage-point difference; 95% CIs are descriptive normal-approximation intervals. The reduced-harm outcome reports selection of the response designated as less harmful in the study questionnaire and should not be interpreted as an independent or universal product-safety conclusion.

Intended smoking-cessation recommendations

Recommendation outcomes were summarised descriptively because retailer pre- and post-training questions differed in wording and response structure and CBO paired multicategory transitions were sparse. In the pre-training retailer questionnaire, 15/139 participants selected the tobacco harm-reduction response option. In the differently structured post-training questionnaire, 127/139 selected that option. Because the questions and available response options differed, these figures were not interpreted as a paired change. Among CBO workers, the response distribution shifted from predominantly NRT and willpower categories at baseline towards the harm-reduction response category after training. These results were analysed descriptively; no inferential p-values are reported (Table 4).

Table 4
Intended smoking-cessation recommendations before and after training

Group	Recommendation	Pre n/N (%)	Post n/N (%)
Tobacco retailers	Nicotine replacement therapy	10/139 (7.2)	17/139 (12.2)
Tobacco retailers	Tobacco harm reduction products	15/139 (10.8)	127/139 (91.4)
Tobacco retailers	Willpower alone	25/139 (18.0)	18/138 (13.0)
Tobacco retailers	Other	10/139 (7.2)	0/139 (0.0)
CBO workers	Nicotine replacement therapy	83/138 (60.1)	25/140 (17.9)
CBO workers	Tobacco harm reduction products	8/138 (5.8)	94/140 (67.1)
CBO workers	Willpower alone	43/138 (31.2)	13/140 (9.3)
CBO workers	Other	4/138 (2.9)	8/140 (5.7)
Note. Results are descriptive. Multiple selections were recorded for the post-training retailer advice item; percentages therefore do not sum to 100%. Retailer pre/post recommendation items differed in wording and response structure. CBO paired multicategory transition cells were sparse, so no reliable asymptotic marginal-homogeneity test was reported.			

Three-month follow-up outcomes

Follow-up data were available for 113 participants, including 56 tobacco retailers and 57 CBO workers. Overall, 108/113 (95.6%) reported discussing smoking cessation with adult smokers. Forty-nine participants (43.4%) reported approaching more than 15 smokers. Among the 108 participants with a non-missing agreement response, 39 (36.1%) reported that 1–5 smokers agreed to quit combustible smoking, 35 (32.4%) reported 6–10, 19 (17.6%) reported 10–15, and 15 (13.9%) reported more than 15. The follow-up questionnaire contained overlapping response categories (6–10 and 10–15), which may have introduced classification ambiguity. These outcomes were reported by trained participants and were not independently verified as smoking-cessation outcomes (Table 5).

Table 5
Three-month self-reported outreach outcomes

Outcome/category	Tobacco retailers (n = 56)	CBO workers (n = 57)	Total (N = 113)
Reported discussing cessation	53 (94.6)	55 (96.5)	108 (95.6)
Smokers approached			
None	3 (5.4)	2 (3.5)	5 (4.4)
1–5	5 (8.9)	8 (14.0)	13 (11.5)
6–10	13 (23.2)	16 (28.1)	29 (25.7)
10–15	10 (17.9)	7 (12.3)	17 (15.0)
> 15	25 (44.6)	24 (42.1)	49 (43.4)
Participant-reported agreement category			
1–5	15 (28.3)	24 (43.6)	39 (36.1)
6–10	23 (43.4)	12 (21.8)	35 (32.4)
10–15	8 (15.1)	11 (20.0)	19 (17.6)
> 15	7 (13.2)	8 (14.5)	15 (13.9)
Missing agreement response	3 (5.4)	2 (3.5)	5 (4.4)
Note. Agreement-category percentages use non-missing denominators (tobacco retailers n = 53; CBO workers n = 55; total n = 108). The follow-up response categories recorded in the source data include overlapping 6–10 and 10–15 categories. Outcomes are self-reported and do not represent verified smoking cessation.			

Discussion

This study assessed changes following a standardised smoking-cessation training programme delivered to tobacco retailers and CBO workers across six cities using a paired pre–post design. Training was associated with substantial improvements in knowledge of evidence-based smoking-cessation approaches and changes in nicotine-related perceptions. At follow-up, participants reported engaging adult smokers in cessation and harm-reduction discussions, but these activities were not independently verified. The findings therefore support conclusions about trainability, knowledge change and intended communication, rather than about verified changes in smokers’ behaviour.

Knowledge Findings

Participants demonstrated improvements in knowledge following training, particularly regarding modern smoking-cessation methods and misconceptions surrounding nicotine. This is consistent with evidence

that community health-worker involvement may support cessation activities [8]. The modest change in identifying nicotine as the addictive substance may reflect relatively high baseline knowledge.

Nicotine Misconceptions

One of the largest observed changes was in responses to the nicotine-and-disease item. Although the principal disease burden from cigarette smoking arises from combustion-generated toxicants, nicotine is addictive and is not risk-free. The item should therefore be interpreted as a measured perception rather than as a universal product-safety conclusion. Misconceptions and evidence gaps regarding non-combustible nicotine products remain important considerations [6, 7].

Community-Based Implementation

The findings also highlight the potential value of engaging community-facing individuals in smoking cessation initiatives. Tobacco retailers and CBO workers frequently interact with adult smokers during routine community activities and therefore represent potential channels for expanding access to brief smoking cessation advice beyond traditional healthcare settings. While healthcare professionals remain central to tobacco dependence treatment, community-based educational approaches may complement existing cessation services by increasing opportunities for smokers to receive evidence-based information and encouragement to seek support.

Public Health Implications

The large post-training increases in awareness of modern cessation methods in both groups suggest that a standardised one-day programme can address specific knowledge gaps among community-facing workers. The marked shifts in nicotine-related perceptions and intended recommendations further indicate that structured information and training can substantially change what participants know and intend to communicate. These groups may therefore represent useful channels for extending smoking-cessation education in resource-constrained settings. However, the study does not establish that the training caused subsequent community interactions or improved smokers' cessation outcomes, and controlled studies with longer follow-up and verified smoker-level outcomes are needed.

Strengths

The study included participants from six geographically diverse cities in Pakistan and evaluated two distinct community-facing groups using a standardised training programme. The paired pre–post design enabled within-participant assessment of changes in knowledge and perceptions, and the follow-up assessment provided additional information regarding participant-reported community outreach activities. Furthermore, the statistical analyses were based on matched participant data and employed appropriate paired analytical methods, strengthening the internal validity of the findings.

Limitations

The one-group, non-randomised design without a control group limits causal inference. Purposive recruitment may have introduced selection bias and limits generalisability. Follow-up outcomes were self-

reported and susceptible to recall and social-desirability bias; no smoking-cessation outcome was independently verified. Follow-up retention was 40.5% (113/279), so attrition bias is possible. Immediate post-training assessment may overestimate sustained knowledge retention. Retailer recommendation questions were not equivalent across time, and the follow-up response categories included overlapping 6–10 and 10–15 categories. Questionnaire psychometric evaluation was limited. Multiple item-level comparisons and possible clustering by city or workshop were not accounted for. Exploratory analyses of the follow-up agreement categories are provided in Additional file 2; because these outcomes were category counts and the regression diagnostics indicated model instability, they should not be interpreted as individual smoker-level cessation effects or evidence of intervention effectiveness.

Future research

Future studies should evaluate similar community-based smoking-cessation training programmes using controlled designs, longer follow-up, and objectively verified smoking-cessation outcomes. Research is also needed to assess cost-effectiveness, scalability, and long-term public-health impact.

Conclusions

In this one-group paired pre–post study, the standardised training was associated with improved smoking-cessation knowledge and with changes in nicotine-related perceptions among tobacco retailers and CBO workers. At follow-up, participants reported community outreach activities, but these reports were not independently verified and do not establish an effect of the training on smokers' behaviour.

These findings support the feasibility of training community-facing groups to complement existing smoking cessation services, particularly in resource-constrained settings where access to specialised cessation support is limited. While healthcare professionals remain central to the delivery of smoking cessation treatment, appropriately trained community members may help expand the reach of evidence-based cessation information and encourage smokers to seek appropriate support.

Abbreviations

CBO — Community-based organisation

CI — Confidence interval

NRT — Nicotine replacement therapy

THR — Tobacco harm reduction

WHO — World Health Organization

Declarations

Ethics approval and consent to participate

The study received ethical approval from the Institutional Review Board (IRB) of Riphah International University, Islamabad, Pakistan (IRB approval no. IRB/003/2025). **The study was conducted in accordance with the principles of the Declaration of Helsinki.** Participants were informed about the study objectives, the voluntary nature of participation and their right to withdraw at any time without providing a reason. Written and verbal informed consent was obtained from all participants before participation in the study.

Consent for publication

Not applicable.

Availability of data and materials

The de-identified datasets are available from the corresponding author on reasonable request, subject to ethical, institutional and participant-confidentiality requirements.

Competing interests

MQ received research funding from Global Action to End Smoking for the study reported in this manuscript and declares no other financial or non-financial competing interests.

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The contents, selection, and presentation of facts, as well as any opinions expressed in the study are the sole responsibility of the author and under no circumstances shall be regarded as reflecting the positions of the Global Action to End Smoking. The funder had no role in study design, participant recruitment, data collection, statistical analysis, interpretation of the findings, preparation of the manuscript, or the decision to submit for publication.

Authors' contributions

MQ conceived and designed the study; coordinated the training intervention and data collection; curated and interpreted the data; supervised and verified the statistical analyses; and drafted, critically revised, and approved the final manuscript. MQ accepts full responsibility for the integrity and accuracy of the work.

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References

1. World Health Organization. WHO report on the global tobacco epidemic. 2023: protect people from tobacco smoke [Internet]. Geneva: World Health Organization; 2023 [cited 2026 Jul 27]. Available from: <https://www.who.int/publications/i/item/9789240077164>
2. Durr-e-Nayab, Nasir M, Memon JA, Siddique O. The economic cost of tobacco-induced diseases in Pakistan. PIDE Research Report No. 41 [Internet]. Islamabad: Pakistan Institute of Development Economics; 2021 [cited 2026 Jul 27]. Available from: <https://pide.org.pk/research/the-economic-cost-of-tobacco-induced-diseases-in-pakistan/>
3. Tobacco Control Cell, Ministry of National Health Services. Regulations and Coordination, Government of Pakistan. Facts about tobacco [Internet]. Islamabad: Government of Pakistan; [cited 2026 Jul 23]. Available from: <https://tcc.gov.pk/fact.php>
4. World Health Organization. WHO clinical treatment guideline for tobacco cessation in adults [Internet]. Geneva: World Health Organization. 2024 [cited 2026 Aug 21]. Available from: <https://www.who.int/publications/i/item/9789240096431>
5. WHO Framework Convention on Tobacco Control. Guidelines for implementation of Article 14: demand reduction measures concerning tobacco dependence and cessation [Internet]. Geneva: World Health Organization. 2013 [cited 2026 Jul 27]. Available from: <https://fctc.who.int/resources/publications/m/item/guidelines-for-implementation-of-article-14>
6. Royal College of Physicians. E-cigarettes and harm reduction: an evidence review [Internet]. London: Royal College of Physicians; 2024 [cited 2026 Jul 27]. Available from: <https://www.rcp.ac.uk/policy-and-campaigns/policy-documents/e-cigarettes-and-harm-reduction-an-evidence-review/>
7. Travis N, Warner KE, Goniewicz ML, Oh H, Ranganathan R, Meza R, et al. The potential impact of oral nicotine pouches on public health: a scoping review. *Nicotine Tob Res.* 2025;27(4):598–610. 10.1093/ntr/ntae131.
8. Zulkipli SH, Ramli LF, Fisal ZAM, Tabassum B, Abdul Manaf R. Effectiveness of community health workers involvement in smoking cessation programme: a systematic review. *PLoS ONE.* 2020;15(11):e0242691. 10.1371/journal.pone.0242691.
9. Cheng CCW, He WJA, Gouda H, Zhang MJ, Luk TT, Wang MP, et al. Effectiveness of very brief advice on tobacco cessation: a systematic review and meta-analysis. *J Gen Intern Med.* 2024;39(9):1721–34. 10.1007/s11606-024-08786-8.
10. Shaheen N, Ngoma C, Adebisi YA, Glover M. Lady health workers smoking cessation initiative in rural Pakistan. *Discover Global Soc.* 2024;2:88. 10.1007/s44282-024-00121-0.
11. Warsi S, Elsey H, Boeckmann M, Noor M, Khan A, Barua D, et al. Using behaviour change theory to train health workers on tobacco cessation support for tuberculosis patients: a mixed-methods study in Bangladesh, Nepal and Pakistan. *BMC Health Serv Res.* 2019;19:71. 10.1186/s12913-019-3909-4.