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Investigating the socio-demographic characteristics and smoking cessation incidence among smokers accessing smoking cessation services in primary care settings of Qatar, a Historical Cohort Study

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Abstract

Background Tobacco dependence is a chronic disease that often requires repeated interventions and multiple attempts to quit. Cigarette smoking is the leading preventable cause of mortality. Globally, an estimated 1.3 billion people smoke. In Qatar, Smoking cessation services (SCSs) are provided free of charge to citizens and at a minimal cost to non-citizens. This study aimed to measure the effectiveness of the smoking cessation program adopted by the Primary Health Care Corporation (PHCC) of Qatar. This was achieved through calculating the percentage of smoking cessation service users (survival probabilities) who maintained the non-smoking status after selected follow up periods. Moreover, the study highlighted the possible association of selected explanatory variables with smoking cessation survival probabilities.

Methods In this historical cohort study 490 participants were recruited by simple random sampling who attended the smoking cessation clinics (SCCs) in PHCC prior to 30/06/2021. The participants were contacted by phone and invited to participate in the study. The participants who agreed to participate in the study were interviewed utilizing a structured questionnaire.

Results Initially 311 (63.5%) of the participants quitted smoking after receiving SCSs. There were statistically significant differences between quitting smoking and the nationality and the educational level of participants (p ≤ 0.001 and 0.02 respectively). About one fourth (23.3%) of individuals who initially quitted smoking relapsed and resumed smoking as early as 6 months after completing their SCC visits. This relapse rate increased to 38.7, 47.2 and 51.1% after 12, 24 and 36 months respectively. Less than a half (45.8%) maintained the non-smoking status after 42 months from their initially quitting.

Conclusion and recommendations The findings of the study substantiate the effectiveness of SCSs designed within PHCC both in short- and long-term basis. Younger individuals, smokers with Arab ethnicity, smokers falling within high income and education groups were identified as high-risk groups and need highest focus. The accessibility to the service among the local population can be increased by upscaling the advertisement of the existing services.

Keywords Smoking · Cessation · Incidence · Primary Care · Relapse

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1 Introduction

Globally, smoking and its associated health implications has been a major public health concern over the decades [1–3]. Accordingly, to the World Health Organization (WHO) there are 1.3 billion tobacco consumers worldwide which causes 8 million deaths annually [4]. Evidence suggests that smoking contributes to a myriad of preventable diseases and premature deaths [3]. Smoking rates estimated to be as high as 50 percent for men in developing countries and mostly concentrated among those of low socioeconomic status [5, 6].

Cigarettes are the most common smoking item consumed in the various geographical settings compared to the other tobacco products [4].

There have been various interventions and preventive strategies that have been implemented in various settings through smoking cessation services [7, 8]. These interventions mainly constitute therapeutic and behavioral interventions [7, 9]. The framework convention on tobacco control (FCTC) was launched under the auspices of WHO as an international coordinated response to tackle the tobacco epidemic [10]. The various strategies advocated by the initiative included implementing tax measures to restrict tobacco consumption, promoting smoke-free environment at work and public places, restricting and banning all types of marketing of smoking products and strengthening legislative measures to prevent illicit trade of tobacco products [11]. Despite these global initiatives, a significant portion of the population continue to smoke globally [12].

It is extensively discussed in literature that there are different factors contributing to smoking initiation such as and not limited to attitudes and beliefs, nicotine dependence, availability of flavored tobacco products, use of e-cigarettes, previous experience with smoking even few puffs, depression, poor school performance and substance abuse [13–18]. In addition, there are various factors linked with smoking behaviors, accessibility of smoking cessation services and compliance to the various cessation interventions. These mainly include socio-demographic characteristics of smokers, cultural issues, economic status, ethnicity and age [3].

Clinician involvement increases the likelihood of smoking cessation. The goal of smoking cessation establishment is to offer evidence-based services [19]. Tobacco dependence interventions, if delivered in a timely and effective manner, significantly decrease the risk of smoking-related morbidity and mortality [20, 21]. The clinician's role is to document smoking status, offer advice to quit, evaluate the patient's interest in quitting. Then, for those interested in quitting, offer tools, techniques, and follow-up. For those not ready to quit, the clinician can use motivational interviewing to move the smoker towards quitting. [22–25].

Qatar has well-developed and modernized healthcare system with comprehensive primary health care services which provide specialized evidence-based smoking cessation services. These services usually provided through different initial and follow up visits. Despite these healthcare resources smoking remains a major public health concern [26]. Whereas the overall prevalence of smoking was 16.4% among the studied population in the STEP wise survey, and the percentage of smoking among men was almost 27 folds higher than that among women (31.9 vs. 1.2%) [27].

To reduce inappropriate variation in smoking cessation support practice and to promote efficient use of resources, PHCC developed a smoking cessation guideline aimed to describe appropriate care based on the best available scientific evidence and broad consensus for smoking cessation practice [28]. According to that guideline the provided care mainly formed of assessing services such as assessing carbon monoxide level and assessing nicotine dependence using Fagerstrom Test for Nicotine Dependence. In addition to the assessing tests the clinician's services mainly formed of general/ behavioral counseling according to each case separately and pharmacotherapy (see appendix 1). Since SCSs are already in place within the PHCC, this study may cover the current situation and discover any gaps and deficiencies that may be presented within the services provided.

The main aim of the study is to investigate the demographic profile, attributes and the incidence of smoking cessation among individuals receiving smoking cessation services in primary care settings of Qatar, as well as assessing the rate of relapse for those who initially quitted smoking after attending the SCCs. The findings of the study may inform policymakers and public health authorities in Qatar to develop evidence-based tobacco control policies.

2 Methods

2.1 Study design

This is a historical cohort study implemented on a primary care level.

2.2 Study population

Smokers were recruited in the study who were accessing smoking cessation clinics and were registered at primary health care centers in Qatar on June 30th, 2021. Smokers who did not complete 42 months of follow-up since quitting smoking were excluded from the study.

2.3 Sample size calculation

The non-parametric exponential model for survival analysis used to calculate the required sample size for performing survival analysis on persons who reported quitting smoking during their enrollment period for smoking cessation program [29]. The model was fed with the following parameters:

- Length of accrual period = 42 months
- T, the length of follow-up period-time from end of accrual to analysis = 6 months
- α, the significance level = (0.05)
- Two-sided test
- Estimated Survival probability at time t = 12 months = 0.5
- Upper and lower critical values for the estimated survival probability = 0.05 (95% confidence interval of 1-year survival rate of 0.45 to 0.55)

   The sample size required for performing the required survival analysis under the above model parameters was 330. Under the assumption of 50% rate for quitting smoking during the smoking cessation program visits we needed to double the required sample size to 660 to end with the required 330 who quitted smoking. In addition, we added another 130 participants to the required sample size to account for an expected 20% non-response rate. The final sample size became 790.

2.4 Data collection

A simple random sample of 790 participants were extracted from the PHCC electronic registry of all attendees to the SCCs until 31/6/2021 to take part in this study. That was after exclusion of those who did not complete 42 months of follow-up on that date. Of those participants, only 490 have gave their verbal consents to participate in the study. Data were collected by well-trained data collectors through phone interviews with the participants used a structured questionnaire form. Prior to data collection, the questionnaire was piloted amongst 20 selected past users of SCC and their feedbacks were used to make any necessary amendments.

2.5 The study tool

The structured questionnaire has developed by the researchers, the content and face validity have established by an extensive literature review, consultation of the community medicine faculty and experts in the field of smoking cessation [5, 30–83]. The questionnaire has originally prepared in English and translated into Arabic language with back translation to ensure its validity. The translation done by the lead researcher using several medical dictionaries and then was revalidated again by two Community Medicine Experts after reverse translation. After conducting an extensive literature, the aim and objectives of the study served as a guide for the researcher in developing the content of the questionnaire.

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The final version of the questionnaire covered several areas which were the history of visits to SCCs with their initial outcome, the sociodemographic characteristics of participants, impact of smoking cessation on health status and the socio-economic status of participants, as well as the withdrawal symptoms of smoking cessation.

The component of the study tool which includes multiple choice questions, some of the patients may have more than eligible choices or responses. The interaction between the different choices or responses can influence the reported percentage of the overall response rates, for example the reasons for visiting SCC. A copy of the questionnaire added as a supplementary file.

2.6 Data analysis

Statistical analysis was done using IBM SPSS Statistics software version 28. Descriptive statistics were done first. The association between selected explanatory variables (age, gender, nationality, income, marital status, and educational level) and mean survival time for keeping the non-smoker status was tested for statistical significance by Kaplan Myer test in bivariate model.

The effectiveness (success) of the smoking cessation program will be assessed at two levels using incidence rates. The short-term success rate is the incidence rate of quitting smoking during the clinic contact time (primary smoking cessation rate/the percentage of participant quitted smoking directly by attending the SCC). Among those who successfully quitted smoking the long-term success will be calculated using the survival rate (being free from smoking habit relapse) after 1, 6, 12, 24, 36 and 42 months of quitting smoking during clinic visit.

3 Results

A total of 790 individuals were approached to participate in the study. Data was collected from 490 participants with a response rate 62%. The demographic details of the participants are depicted in Table 1. A significant percentage of participants (43%) were within the range 30–39 years of age followed by 40–49 years of age group (28%). Most participants (n = 468) were males and had a smoking history of more than 10 years (90.2%). Majority were cigarette smokers (96.3%) followed by Shisha smoking (19.8%) as demonstrated in Table 1.

As shown in Table 2, more than 85% of participants reported that attending the SCCs was due to their self-decision followed by 18% reported family and relatives' pressure as a reason. This shows that making the decision to abstain from smoking is usually based on different motives and reasons, but in the end personal decision is the basis.

Table 3 shows that 311 (63.5%) of the study's participants have quitted smoking during their attending of SCCs and receiving the SCSs. This means that the person quit smoking during the period of his/her visit to the SCC to obtain the service, and this period usually ranges from one day to three months. It also showed that the relation between quitting of smoking with the nationality and the educational level of participants was statistically significant. Qataris had a significantly lower quit rate than the other two nationality groups. A lower educational level was associated with a significantly higher quit rate.

As shown in Table 4, only 2.3% of individuals who initially quitted smoking after SCC visits relapsed and resumed smoking as early as one month after completing their clinic visits. This relapse rate increased to 23.3% after 6 months and 38.7% after 12 months. After 24 months or more of quitting, this rate stabilized at around the level of 50%.

Following the content of Table 4, Fig. 1 is a line graph (survival curve) showing the cumulative incidence rate of maintaining the non-smoking status after selected follow up periods extended to 42 months for those who initially quitted smoking after attending the SCCs at the primary health care centers in Qatar. This graph showed that the median survival for the non-smoking status was 36 months.

As shown in Table 5, all the tested explanatory variables failed to predict significant differences in the risk of smoking relapse for those who initially quitted smoking after getting SCSs. Otherwise, the results showed that the mean survival time (MST) increased visibly with age ≥ 40 years old and showed that there is difference in the mean between Qataris and other Arabs (30.9 vs. 24.4 respectively).

4 Discussion

The SCCs practiced in primary care settings in Qatar are an amalgam of educational, clinical, and social interventions. These services are usually provided by an initial visit as well as several follow up visits according to each case. The different strategies implemented by the clinics in the PHCC constitute of two-tier system. It consists of an initial

Table 1 Description of the study sample (N = 490)

Variable	Categories	N	%
Age group (years)*	< 30	43	8.8
	30–39	212	43.3
	40–49	137	28.0
	50–59	71	14.5
	60 +	27	5.5
Gender	Female	22	4.5
	Male	468	95.5
Nationality	Qataris	65	13.3
	Arabs (excluding Qataris)	359	73.3
	Others	66	13.5
Average monthly income (Qatari Riyals"QAR") (1USD = 3.65 QAR)	< 10,000	256	52.2
	10,000–39999	216	44.1
	≥ 40,000	18	3.7
Ever Married	No	61	12.4
	Yes	429	87.6
Educational level	Did not complete secondary school	79	16.1
	Completed secondary school	72	14.7
	Diploma/university and above	339	69.2
Duration of smoking habit (years)**	< 10	48	9.8
	10–19	199	40.7
	20–29	159	32.5
	30 +	83	17.0
Type of smoking item***	Cigarettes	472	96.3
	Cigars	10	2.0
	Medwakh	46	9.4
	Shisha	97	19.8
	Pipe	3	0.6
	Electronic tobacco devices	22	4.5

*Age: mean = 40 year, SD = 10.2 years, range: (18–79)

**Duration of smoking: mean = 19.5 years, SD = 9.6 years, range (1–60)

***The categories for type of smoking item are not mutually exclusive

Table 2: The relative frequency of reported reasons for attending the SCCs, (N = 490)

The reported reason*	N	%	95% confidence interval (%)
Self-decision	420	85.7	(82.4 to 88.6)
Spouse, children and/or relatives' pressure	88	18.0	(14.8 to 21.5)
Health complaint perceived as being related to smoking	45	9.2	(6.9 to 12)
Peers pressure	24	4.9	(3.2 to 7.1)
Reported reason behind attending the SCC-Doctor warning	22	4.5	(2.9 to 6.6)
COST	3	0.6	(0.2 to 1.6)
Friend's advice	1	0.2	(0 to 0.9)
Social media	1	0.2	(0 to 0.9)

*The categories for reported reasons are not mutually exclusive

assessment conducted by nursing staff which is followed by clinician led services which encompasses general/behavioral and pharmacotherapy interventions (see appendix 1). The main findings of the study substantiate the effectiveness of SCSs designed within PHCC both in short- and long-term basis which is substantiated by the fact

Table 3 The primary smoking cessation rate immediately after/during receiving of SCSs (range from 1 day to 3 months) by selected predictors, (N = 490)

Variable	Categories	Quitted smoking while visiting the smoking cessation clinic						p-value
		Negative		Positive		Total		
		N	%	N	%	N	%	
Age group (years)	< 30	22	51.2	21	48.8	43	100.0	0.299
	30–39	77	36.3	135	63.7	212	100.0	
	40–49	48	35.0	89	65.0	137	100.0	
	50–59	24	33.8	47	66.2	71	100.0	
	60+	8	29.6	19	70.4	27	100.0	
	Total	179	36.5	**311**	**63.5**	490	100.0	
Gender	Female	5	22.7	17	77.3	22	100.0	0.169
	Male	174	37.2	294	62.8	468	100.0	
Nationality	Qataris	39	60.0	26	40.0	65	100.0	**< 0.001**
	Arabs (excluding Qataris)	117	32.6	242	67.4	359	100.0	
	Others	23	34.8	43	65.2	66	100.0	
Average monthly income (QAR)	< 10,000	89	34.8	167	65.2	256	100.0	0.600
	10,000–39999	82	38.0	134	62.0	216	100.0	
	≥ 40,000	8	44.4	10	55.6	18	100.0	
Ever married	No	25	41.0	36	59.0	61	100.0	0.448
	Yes	154	35.9	275	64.1	429	100.0	
Educational level	Did not complete secondary school	18	22.8	61	77.2	79	100.0	**0.022**
	Completed secondary school	28	38.9	44	61.1	72	100.0	
	Diploma/university and above	133	39.2	206	60.8	339	100.0	
Duration of smoking habit (years)-categories	< 10	25	52.1	23	47.9	48	100.0	0.125
	10–19	72	36.2	127	63.8	199	100.0	
	20–29	54	34.0	105	66.0	159	100.0	
	30+	28	33.7	55	66.3	83	100.0	

that less than a half (45.8% which represents 29% of the total participants in the study) maintained the non-smoking status after 42 months from their initially quitting. Moreover, the study highlighted that younger individual, smokers with Arab ethnicity, smokers falling within high income and education groups were identified as high-risk groups and need highest focus.

The main findings of the study signify the fact that the strategies utilized in SCCs of PHCC are effective and can be further upscaled by active engagement of the community.

Recent studies indicate higher smoking trends and patterns among younger age groups particularly among youth [80, 81, 84]. Interestingly, the results of this study highlighted increased smoking rates among middle aged (30–49 years of age) individuals, which eventually decreased among participants older than 60 years of age. The study recruited mostly males with females constituting only 4.5% of the total sample of smokers. Evidence suggests that males have a greater tendency to smoke tobacco [31, 32, 85]. Nevertheless, recent published literature suggests a change in smoking habits with higher incidence among females [33, 34]. The literature suggests that there are higher rates of smoking among ethnic minorities and marginalized populations [81, 86]. A significant percentage of smokers (87%) in this study were non-Qataris and represented the expat population. These findings substantiate the fact that smoking cessation services need to be adapted to meet the needs of these communities [87].

In the present study, more than half of the smokers included in the study had low- or middle-income status. These findings are comparable to studies conducted in the U.S. and China which indicate the association of poverty levels with current smokers [5, 32]. Interestingly the findings of the study revealed a high prevalence of smoking among participants with a substantial educational background. In contrast, the literature suggests that tobacco consumption is more common among populations with low literacy levels and comprising marginalized segments of society as previously discussed [32, 35].

Table 4 Kaplan Myer survival analysis predicting smoking relapse for those who initially quitted smoking after receiving SCSs, (N = 311)

Time (months after completing SCC sessions) for those who initially quitted smoking	Cumulative incidence of smoking relapse after selected follow up periods (%)	Cumulative incidence of maintaining the non-smoking status after selected follow up periods (%)	95% confidence interval
1	2.3	97.7	(96 to 99.4)
6	23.3	76.7	(71.9 to 81.5)
12	38.7	61.3	(55.7 to 66.8)
24	47.2	52.8	(46.7 to 58.9)
36	51.1	48.9	(42.1 to 55.7)
42	54.2	45.8	(37.2 to 54.5)

Fig. 1 line graph (survival curve) showing the cumulative incidence (%) of maintaining the non-smoking status after selected follow up periods for those who initially quitted smoking after receiving of SCSs
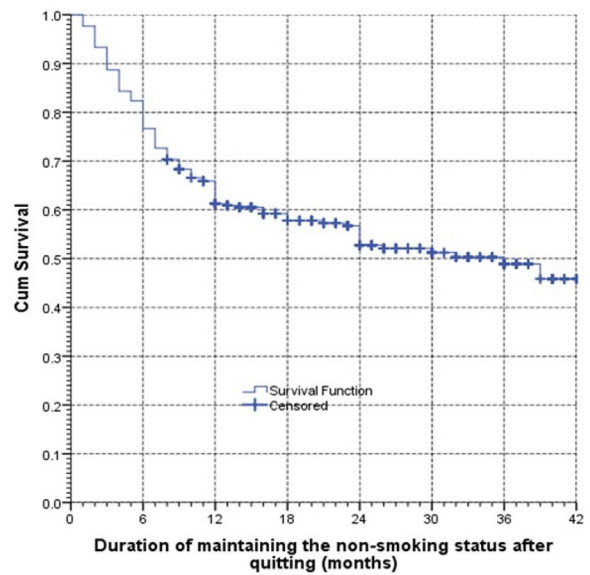
Table 5 The mean survival (maintaining the non-smoking status) time in months predicting smoking relapse for those who initially quitted smoking after attending SCCs

Variable	Categories	Mean survival time (months)	SE	95% confidence interval of survival time (months)	p-value
Gender	Female	23.2	3.6	(16.1 to 30.4)	0.917
	Male	25.7	1.1	(23.7 to 27.8)	
Age group (years)	<30	18.4	3.4	(11.9 to 25)	0.391
	30–39	24.8	1.6	(21.7 to 27.9)	
	40–49	27.1	1.8	(23.5 to 30.6)	
	50–59	27.8	2.6	(22.6 to 32.9)	
	60 +	27.1	3.8	(19.7 to 34.4)	
Nationality	Qataris	30.9	3.3	(24.4 to 37.3)	0.059
	Arabs (excluding Qataris)	24.4	1.2	(22.1 to 26.7)	
	Others	29.2	2.4	(24.4 to 33.9)	
Average monthly income (QAR)	<10,000	26.6	1.4	(23.9 to 29.3)	0.627
	10,000–39999	24.9	1.5	(21.9 to 27.9)	
	≥40,000	16.2	4	(8.3 to 24.1)	
Ever married	No	24.2	2.7	(18.9 to 29.4)	0.972
	Yes	25.7	1.1	(23.6 to 27.8)	
Educational level	Did not complete secondary school	26.9	2.2	(22.5 to 31.3)	0.861
	Completed secondary school	23.9	2.6	(18.8 to 29)	
	Diploma/university and above	25.7	1.3	(23.2 to 28.1)	
Duration of smoking habit (years)- categories	<10	25.5	3.7	(18.3 to 32.7)	0.764
	10–19	24.5	1.6	(21.3 to 27.6)	
	20–29	26.9	1.7	(23.4 to 30.3)	
	30 +	25.5	2.3	(21 to 30.1)	

   Although there are a significant number of smokeless tobacco users worldwide, cigarette smoking remains the most common route of tobacco consumption, as indicated in this study [82, 83]. Cigarettes are easily available and can be bought at a cheaper price in Qatar than other tobacco products. This might also explain why most smokers (96.3%) consumed this smoking item.

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Several studies have emphasized that social support including family and friends has the greatest effect on quit attempts, especially when it is continuing and nondirective as indicated by this study [35, 37, 41]. There are various societal factors that may influence on quitting smoking. Literature highlights various factors namely; partner who dislike smoking or support quitting had a positive influence on quit attempts [38, 79], social avoidance by nonsmokers acts as motivation for smoking cessation [37] and relatives encouragement or illness act as specific reasons for quitting [44]. Smoking cessation is usually mediated by the socioeconomic characteristics of people which affect their habits and decisions [46].

The findings of the study indicated the effectiveness of the smoking cessation services provided within primary care settings in Qatar as nearly two thirds of participants reported initially quitting smoking after receiving the services. One of the key findings of the study was that the rate of successful quitters in the long-term was 29% among the total participants in this study. Similarly, a study assessing the long-term outcome of smoking cessation in outpatient clinic reported a quitting success rate of 20.5% [88]. Evidence suggests that sustained, accountable and comprehensive smoking cessation initiatives can be used to effectively manage tobacco consumption within communities and provide the necessary help for smokers to quit smoking [47–49]. Interestingly, the average abstinence rates increase when multimodal interventions (pharmacological and nonpharmacological) are used [43].

Various studies have demonstrated the association between the age of smokers and compliance with smoking cessation services and expected outcomes. Apparently, the findings suggest that the younger the age group is the lower the likelihood of smoking cessation is, whereas compliance with cessation services increases with age [50–52]. In this study, smoking cessation was relatively greater among females than among males. The literature suggests that quitting smoking differs between males and females to a certain degree, and many factors such as age, the amount of smoking, and many others may affect this difference [50, 54, 71].

Quit smoking is relatively common among the low-income population as shown in this study and others [47]. Studies contradicting the results of this study showed that smokers with higher incomes or higher social levels were more likely to intend to quit smoking and to abstain for longer durations [55, 89]. However, other studies have found no income differences in quit attempts [62, 64]. Several studies have indicated the clear impact of marital status on smoking status and the decision to quit smoking [56, 67, 68]. This study revealed that smoking cessation initiation was relatively greater among married participants. This may be due to many factors, such as thinking about the health of children or interest in preserving the family's economic resources. In contrast to our findings, smokers with higher education levels were more likely to intend to quit, to quit, or to abstain for different periods [50, 63]. A study showed that a higher education level was associated with more smoker-related stigma than a lower education level [61]. However, other studies have shown no differences in education level [62, 64].

In this study, the rate of relapse to smoking increased dramatically over time until 24 months after the patient quit smoking. After that, the rate became relatively stable at approximately 50%. These findings are supported by other studies from different countries [62, 63].

The relapse rate is greater among young people than among older people, as indicated in this study and others [57, 72, 73]. One study indicated that age was a significant predictor of smoking cessation [59]. The same study showed that an earlier age at which smoking started was associated with not quitting smoking compared to when people started smoking at an older age [59]. Age did not affect the relapse rate in another study [70].

It is a common assumption that the financial strain has a negative impact on smoking cessation interventions. Contrary to this perception the study findings indicate that the duration of smoking abstinence was inversely related with the level of monthly income. However, evidence indicate that ex-smokers experiencing financial burden are more likely to relapse or having a shorter smoking abstinence [60, 65]. This may be related to the negative impacts of financial strains on the mental and psychological status of people, which in turn may work as a basis for smoking relapse.

The effect of education level on smoking relapse or abstinence duration was relatively limited in the present study. On the other hand, another study indicated that education was a significant predictor of smoking cessation [59]. A longer duration of smoking abstinence was associated with a lower education level in a study from China [73]. A higher education level was associated with greater smoking relapse in another study[72].

5 Limitations of the study

This study helps to develop a better understanding of smoking cessation presented through the SCCs in the primary care settings of Qatar. One of the important advantages of this study was including population from different ethnicities and geographical origins. The study examined multiple outcomes and covariates over different time duration.

One of the limitations of the study are the potential biases that may result in data collection technique and reliance on self-reporting by the participants. The self-reported nature of the data introduces the possibility of reporting inaccuracies in the outcomes; for example, errors in recalling quit date. Although these issues could lead to overestimating the outcomes, there is no reason to believe they would vary by socioeconomic status and the characteristics of the participants, so the relationship between the outcomes and socioeconomic status as well as the characteristics of the participants would not be affected. Depending on self-reported smoking status without biochemical validation, could be a limitation of this study. Moreover, the actual sample size in the study was much lower than the calculated one due to the high non-response rate, this could have led to non-response bias. Furthermore, the participants social environment was not discussed in the study. However, it is worth mentioning that during the delivery of behavioral interventions to the clients, doctors discuss the social life of the clients which somewhat covers this very important aspect in smoking cessation among individuals.

6 Recommendations

The following recommendations are suggested:

  i.   The smoking cessation services provided with PHCC are apparently effective both in short and long term and this model of care can be further upscaled by active community engagement.
 ii.   The policy makers need to be actively engaged by sharing the findings of the study to revisit the regulatory measures that attempt to cut back on selling cigarettes in Qatar.
iii.   Health education campaigns and preventive strategies should be devised to prevent the spread of modern alternatives for cigarettes such as vapes, pipes, and other tobacco products since they aren't widely spread or available in Qatar tobacco markets.
 iv.   Smoking cessation interventions within the PHCC should specifically focus on high-risk population (individuals below the age of 30, Arab people including Qatari citizens and cohort of highly educated and high income) as indicated by the main findings of the study.
  v.   Further research including mix methods study (quantitative and qualitative) should be conducted to explore the wider determinants of health that may influence smoking cessation and aid in implementing preventive strategies.

7 Conclusion

The study comprehensively examined the various client factors and smoking cessation interventions practiced within a highly organized primary health care setting. The findings of the study substantiate the effectiveness of the interventions both in short- and long-term basis. There is a need to target high risk individuals and upscale the accessibility to the service among the local population by active community engagement, promoting a multi-sectoral approach strengthening legislative and policy measure for smoking cessation services and further advertisement of the existing services.

Declarations

Ethics approval and consent to participate This study has been performed in accordance with the Declaration of Helsinki and have been approved by the Primary Health Care Corporation's Institutional Review Board (PHCC-IRB) in Qatar. Informed consent form have been obtained

from all participants in this study, either directly from the participant or from his/her legal guardian in case of illiterate or below the age of consent (< 18 years of age).

Consent for publication   Not applicable.

Competing interests   All authors declared that they have no competing interests.

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