

Article

Factors Associated with Smoking and Smokeless Tobacco Use, Intention to Quit, and the Number of Cigarettes Smoked among Adults with High Blood Pressure in a Rural District of Bangladesh

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Abstract: The current research is an initial investigation aimed at reporting the factors associated with smoking tobacco, smokeless tobacco (SLT) use, the number of cigarettes smoked, and the intention to quit smoking. A total of 307 adults aged 30 to 75 years with high blood pressure were recruited as part of a cluster RCT from a rural area in Bangladesh. The outcome variables included the number of cigarettes smoked per day, intentions to quit smoking, and SLT use. We used Rasch analysis and regression analysis. A low level of education and older age were associated with smoking tobacco and SLT use, respectively. The 62 smokers smoked 9.6 cigarettes or bidi on average per day, and 54 (87%) knew that smoking was associated with cancer. Overall, 41.6% of farmers compared to 58.9% of employees and 53% of people with no education compared to 75% of people with a higher education intended to quit smoking and SLT use. Our research contributes to the evidence that increasing education increases the intention to quit smoking and identifies population groups that could benefit from targeted public health campaigns. Health education programs are needed to increase motivation to quit smoking, especially among farmers, and to reduce SLT use among women and elderly people.

Keywords: tobacco smoking; smokeless tobacco; intention to quit; Rasch analysis



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1. Introduction

Globally, 1.1 billion people smoke tobacco, and 8 million people die from tobacco use yearly. Of these deaths, 80% occur in low/middle-income countries [1,2]. Approximately 400 million tobacco users live in South East Asia (SEA), which results in 1.2 million deaths annually [3].

Tobacco use causes adverse health effects, such as stroke and coronary heart disease [4], and it is a leading cause of different types of cancer [5,6]. Smokeless tobacco (SLT) also causes serious health problems, including cancers [7] and cardiovascular diseases (CVD) [8–13]. Quitting smoking or discontinuing tobacco smoking lowers the risk of cancers, diabetes, and all causes of mortality and has significant and immediate health benefits [13]. Thus, quitting tobacco smoking is instrumental in reducing tobacco-attributable deaths and diseases [14,15]. The intention to quit smoking is considered the first step before ceasing smoking behavior [16]. However, research has suggested that smokers, especially heavy smokers, are more addicted and less likely to quit, as they are unwilling or unable to quit smoking [17–19].

To reduce smoking prevalence, people need to be aware of all its detrimental effects on health, as this may increase negative attitudes towards smoking and intentions to quit [1,13]. Previous studies have reported a strong association between increased knowledge of the

detrimental effects of smoking and a reduction in smoking and increases in cessation behavior and long-term abstinence from smoking [20–22]. Older people and current smokers with appropriate knowledge of the harmful effects of smoking on health [23] and with higher education levels [24,25] have been associated with higher intentions to quit smoking.

In a large study among patients with pulmonary tuberculosis [25], 52% of smokers intended to quit smoking and the intention to quit smoking was eight times higher among professional people compared to manual workers. The addiction level, smoking frequency, past quitting attempts, length of abstinence during past attempts, and motivation to quit are the predictors for successful quitting [26]. Studies have suggested that intention has been shown to account for 12% of the variance in quitting success rates, and a strong desire to quit was associated with a greater likelihood of quitting smoking [27,28]. However, it is unclear whether the motivation to quit smoking is successful in quitting smoking. A systematic review [29] of 37 studies encompassing over 15,000 smokers concluded that motivational interviews to help people stop smoking were not successful in increasing the intention to quit smoking. The review also found no improvements in mental health and well-being by smoking cessation. E-cigarettes have been proposed as a possible alternative to quitting smoking, and their use has rapidly increased in recent years [30]. Evidence suggests that an increase in the use of e-cigarettes is effective at enabling quitting smoking. For example, in the UK, the use of e-cigarettes rose from 1.7% in 2012 to 7.1% in 2019, and at the same time, smoking rates dropped from 19.6 to 14.7% [31]. However, the use of e-cigarettes is not recommended, and their increased use has been reported to contribute to social inequalities [32,33]. Therefore, smoking cessation is always challenging and needs designed interventions based on risk stratification.

Among women in Asian countries, including Bangladesh, India, and Pakistan, attitudes towards SLT use are generally positive [34]. SLT use is often considered to be less harmful than smoking tobacco, which increases the likelihood of using SLT [34,35]. One study found that the cessation of SLT use was associated with a significant increase in anxiety and oral pain [36], and government quit lines and websites [37] are not always accessible to low-income people who want to quit SLT. These factors contribute to the most vulnerable groups being less likely to reduce or stop using SLT. However, one-time education sessions to help American Indian SLT users to quit showed that 13.5% reduced their use [38].

As in other low/middle-income countries (LMICs), smoking tobacco and SLT use in Bangladesh make significant contributions to the public health burdens of morbidity and disability and increase community costs [39–41]. Tobacco kills 161,253 people each year (19% of all deaths) and accounts for 41% of CVD deaths and 20% of cancer deaths [42]. Bangladesh has been reported to be one of the top ten high-smoking countries in the world, with the prevalence of smoking at 40.56% [42]. The prevalence of tobacco smoking has been consistently found to be higher in men, and SLT use was higher in women and older adults [3,39,42–44]. The prevalence of tobacco smoking has been reported to be higher in labor-based occupations, in poorer people, among slum and tribal populations, and in people with low levels of education. These findings suggest a greater health burden from tobacco use among the disadvantaged groups [34,35,43,45].

In recent years, the prevalence of tobacco smoking has been decreasing but at a slower rate than in previous decades [46]. Nargis et al. [47] used nationally represented data from 2009 and 2012 to inform the International Tobacco Control (ITC) policy in Bangladesh and reported that the prevalence of any tobacco use decreased from 45.1% to 38.5%, and smokeless tobacco decreased from 31.5% to 23.5% in rural areas. Bangladesh was the first signatory of the World Health Organization (WHO) Framework Convention on Tobacco Control (WHO FCTC), signed in 2004. These tobacco control measures are expected to reduce smoking, or at the very least, to arrest the potential rise in smoking prevalence observed in disadvantaged groups [34,35,43,45,47]. Intention to quit smoking or reduce tobacco use, including decreasing the number of cigarettes or bidi, depends on

multiple factors. Previous studies [48–50] have reported a range of factors associated with quitting smoking, such as the area of residence, number of cigarettes/bidis smoked per day, education, age of starting to smoke, older age, type of smokers, attempting to quit in the past year, perceiving health benefit from quitting smoking, and the number of smoker friends. Hakim et al. [51] conducted a large study among people aged 15 years or older. They found that almost half of the people attempted to quit smoking, and people who smoked 10–19 cigarettes per day were less likely to quit. A recent study [52] reported that tobacco use had reduced due to the price increase in tobacco products due to the implementation of a tobacco tax increase. This reduction was higher among rural households and people with less income.

Driezen et al. [49] studied the determinants of intentions to quit smoking among adult smokers in Bangladesh and reported that 36% had the intention to quit smoking in the future. The outcome measure for the study was “any intention to quit”, measured by a dichotomized answer from a single question that provided limited information about the intention to quit smoking. The study used a tool that captured a wide range of questions for measuring the intention to quit smoking and calculated the combined logit score using Rasch analysis [53] to provide a deeper understanding of the intention to quit smoking. The study also demonstrated the usefulness of the application of Rasch analysis in reporting the combined score converted from a categorical scale into a continuous scale.

Islam et al. [54] conducted a cluster-randomized controlled trial for lowering blood pressure by changing lifestyle among people with high blood pressure. One of the study’s secondary objectives was related to the initial investigation of the intention of quitting smoking. The objectives of the current research were to investigate (i) the factors associated with smoking, smokeless tobacco use, the number of cigarettes smoked per day, and the pack-years of cigarettes smoked per week, (ii) the awareness of smoking-related diseases, (iii) intention to quit tobacco use and factors associated with intention and motivation to quit smoking and SLT.

2. Materials and Methods

2.1. Study Subjects and Sample Size

Bangladesh has a population of 163 million people, divided among 64 districts. Each district has 3–8 Upazilas or sub-districts, and each sub-district is divided into 10–15 Unions, which consist of 15–20 villages [55]. A cross-sectional Bangladesh Population-based Diabetes and Eye Study (BPDES) was conducted in 2012, and 3104 adults aged 30–80 in the Banshgram Union of Narail district participated. The BPDES study has been presented in full previously [56,57]. Of the 1256 BPDES participants with hypertension, 307 were randomly recruited into an RCT with the primary aim of lowering their blood pressure by changing lifestyles [54]. The participants in the RCT were recruited between December 2020 and January 2021. Although the data collection period was during the COVID-19 lockdown, the study area was one of the least affected areas in Bangladesh and had fewer restrictions; therefore, data collection was possible by maintaining social distancing between the participants and researchers.

People who participated in the BPDES were eligible for this study if their clinic-measured blood pressure was greater or equal to 130/80 mm Hg and they were not on medication. Participants with controlled blood pressure, defined as <130/80, who were taking antihypertensive medicines for a minimum of six weeks were also eligible [57]. We excluded people who had advanced cardiovascular disease or severe health problems or who did not agree to give written consent to participate in the study.

Factors, especially sociodemographic factors associated with smoking and the use of smokeless tobacco, intention to quit, and the number of cigarettes smoked, were secondary outcomes for the RCT.

2.2. Sample Size

The data from 307 participants with hypertension were collected at baseline as part of a cluster RCT to look at the impact of lifestyle changes on blood pressure. This research is an initial investigation into the intention to quit smoking in smokers with hypertension and whether sociodemographic factors are associated with quitting smoking. A previous intervention study in Bangladesh [45] reported that 36% of participants intended to quit smoking, and a cross-sectional study in Vietnam [58] reported 50% of smokers intended to quit smoking. According to these studies, with 10% precision and a 95% confidence interval, the required sample size was at least 97 participants.

2.3. Recruitment and Data Collection

In collaboration with investigators from the Swinburne University of Technology, a local non-government organization in the Narail district of Bangladesh, the Organization for Rural Community Development, recruited the participants. The Organization for Rural Community Development investigators and trained data collectors communicated with the potential participants by telephone or direct contact. Once potential voluntary participants were identified, their blood pressure levels were taken to assess their eligibility for the study. The data were collected through face-to-face interviews, and equal numbers of men and women were recruited. The chief investigator conducted four Zoom meetings to train the data collectors and local investigators on the steps to be followed to conduct the research. A pilot study of ten adults who were not included in the main research was conducted before the final data collection to familiarize the data collectors with all study procedures and to ensure they were conversant with the questionnaire. The Organization for Rural Community Development's investigator monitored the data collection process for quality assurance. The Organization for Rural Community Development investigator revisited 10% of the households to cross-check data quality.

2.4. Primary Outcome Measures

The primary outcome measures were:

1. Prevalence of tobacco smoking and SLT use;
2. The number of cigarettes per day and pack-year of smoking per week;
3. Knowledge of smoking-related diseases and intention and plans to quit smoking among people who smoke tobacco;
4. Intention to quit SLT use among people who use SLT.

The smokers were asked if smoking caused any diseases, and if the response was "yes", they were asked to identify two diseases they considered strongly associated with tobacco smoking. Intentions and plans for quitting smoking were assessed using the self-reported smoking cessation motivation questionnaire (Q-MAT) [59]. Seven items, including their intention to quit smoking, their feelings about being a smoker, plans for the cessation of smoking, and the effort of quitting smoking, were used to report the overall intention to quit smoking.

Possible answers to the seven-item questionnaire were:

- (i) Item: Thinking about quitting smoking; possible answers: "Not at all", "a little", "a lot", and "enormous";
- (ii) Item: Stopping smoking will increase self-image; possible answers: "not at all", "a little", "a lot", and "enormous";
- (iii) Item: Thinking about stopping smoking at the moment; possible answers: "not at all", "a little", "a lot", and "enormous";
- (iv) Item: Feel unhappy; possible answers: "Never", "sometimes", and "often";
- (v) Item: Plan to quit smoking in the next six months; possible answers: "Smoking as much", "cut down a little", and "cut down a lot";
- (vi) Item: Plan to quit smoking in the next four weeks; possible answers: "Smoking as much", "cut down a little", and "cut down a lot";

(vii) Item: Tried to stop smoking; possible answers: “Never”, “once”, and “several times”.

2.5. Exposure Variables

The exposure variables included the following: three categories of age, including young adults younger than 40 years, adults aged 40 to 59 years, and adults aged 60 years or older; genders, categorized as male and female; level of education, categorized as no schooling, primary to high school (grade 1 to 9), secondary school certificate (SSC), or any higher-level education. The age groupings were selected as there were relatively few people under 40 years of age with hypertension (the eligibility criterion for inclusion in this study) and approximately equal numbers in the two higher age groups. Since most participants had no taxable income, a crude measure of socioeconomic status (SES) was classified as poor and middle class or rich, following Cheng et al. [60]. The participants were asked whether “over the last twelve months, in terms of household food consumption, how would they classify their socioeconomic status?” The possible answers were: (i) insufficient funds for the whole year, (ii) insufficient funds some of the time, (iii) neither deficit nor surplus (balance), or (iv) sufficient funds most of the time. These four categories were dichotomized by designating those who had insufficient funds at least some of the time, categories 1 and 2, as poor, and those who had neither deficit nor surplus (balance) or sufficient funds, categories 3 and 4, as middle class or rich. Occupations were categorized as farmers, homemakers, self-managed businesses, laborers (digging soils, pulling rickshaws, or any laborious work), and government and non-government employees.

Statistical Analysis

The participants’ demographic characteristics, including sex, age, level of education, and occupation, were calculated as frequencies and percentages. Odds ratios (OR) with 95% confidence intervals (CIs) after adjusting for covariates were used to represent the associations of sociodemographic factors with smoking and smokeless tobacco use. The mean number of cigarettes and pack-year of smoking per week with a 95% CI were determined after adjusting for covariates using the generalized linear model (GLM). In the case of association measures of the sociodemographic factors with smoking tobacco and the number of cigarettes smoked, only the male participants were selected not to inflate the association by female participants who were non-smokers. The frequencies and percentages of participants with an awareness of smoking-related diseases were calculated considering the number of smokers as the denominator, and the number of respondents naming the particular disease as the numerator. Items related to intention to quit or plan to quit smoking and SLT use were considered by each Likert scale category. Rasch analysis [61] was used to convert the Likert-scale responses of the intention to quit smoking to an interval scale to create a combined score from all the items. The combined score ranged from 0 to 100, where 0 indicates not probable, 100 indicates entirely likely, and 50 indicates an average probability of all items endorsing quitting smoking. For example, the question of whether they were thinking of quitting smoking at the moment had the following possible responses: “not at all”, “a little”, “a lot”, and “enormously”, where “enormously” meant they were leaning towards quitting smoking. Rasch analysis [61] was used to convert categorical responses of the awareness of quitting smoking to an interval scale to create a combined score from all the items. The combined score ranged from 0 to 100, where 0 indicates “no intention”, and 100 indicates 100% intention to quit smoking. The overall means and 95% confidence intervals for the influence of items on quitting smoking were calculated after adjusting for covariates using the generalized linear model (GLM). The covariates were age, gender, level of education, and occupation. Since the sample size was relatively small, we investigated the skewness and Kurtosis of the combined score. Statistical software SPSS (SPSS Inc., version 27) was used for the analysis. For Rasch analysis, RUMM (RUMM2030) [53] software was used.

3. Results

Approximately half of the participants were 40–59 years of age, half had a primary to high school level of education, and half were homemakers (Table 1).

Table 1. Socio-demographic characteristics of the study participants.

		Number	Percentage
Sex	Female	154	50.2
	Male	153	49.8
Age group, years	Below 40	46	15.0
	40–59	160	52.1
	60 years or older	101	32.9
Level of education	No education	99	32.2
	Primary to high school	149	48.5
	Secondary school certificate or above	59	19.1
Socioeconomic status	Poor or very poor	92	30.0
	Middle class or rich	215	70.0
Occupation	Homemakers	146	47.6
	Businesspersons	24	7.8
	Employees	53	17.3
	Farmer (agriculture or any hard labor)	72	23.5
	Unemployed	12	3.9

Of 153 males, 62 (40.5%) smoked tobacco and 31 (20.3%) used SLT. Of 154 females, none smoked tobacco, and 56 (36.4%) used SLT. After adjusting for socio-demographic factors, education and age were significantly associated with smoking tobacco. For example, having no education was associated with a higher proportion of smoking, with an odds ratio (OR) of 3.76 and a 95% confidence interval (95% CI: 1.27, 11.1). Similarly, gender and age, but not education, were associated with SLT use. SLT use was more likely in women compared to men (OR 2.74; 95% CIs: 1.48, 5.09) and in people older than 60 years compared to people aged below 40 years (OR 3.78; 95% CIs: 1.26, 11.4). Socioeconomic status and occupation were not associated with smoking tobacco or SLT use (Table 2).

Table 2. Smoking and SLT use in people with high blood pressure and their associated socio-demographic factors.

		Smoke Tobacco			Smokeless Tobacco (SLT)		
		No. at Risk	n (%)	OR (95% CI) *	No. at Risk	n (%)	OR (95% CI) *
Sex	Female	154	0 (0)	–	154	56 (36.4)	2.74 (1.48, 5.09)
	Male	153	62 (40.5)	–	153	31 (20.3)	1.0
Age, years	Below 40	20	5 (25.0)	1.0	46	6 (13.0)	1.0
	40–59	63	34 (54.0)	5.09 (1.0, 26.5)	160	43 (26.9)	1.71 (0.63, 4.61)
	60 or above	70	23 (32.9)	2.01 (0.38, 10.7)	101	38 (37.6)	3.78 (1.26, 11.4)
+Level of education	No education	39	20 (51.3)	3.76 (1.27, 11.1)	99	39 (39.4)	2.5 (0.92, 6.82)
	Primary to high school	65	30 (46.2)	2.73 (1.06, 7.06)	149	41 (27.5)	1.89 (0.74, 4.82)
	SSC or above	49	12 (24.5)	1.0	59	7 (11.9)	1.0
SES	Poor	40	18 (45.0)	1.0	92	30 (32.6)	1.0
	Middle class	113	44 (38.9)	1.13 (0.49, 2.57)	215	57 (26.5)	0.92 (0.52, 1.62)
Occupation	Homemaker	0	0	0	146	51 (34.9)	1.27 (0.19, 8.74)
	Businessperson	24	9 (37.5)	0.75 (0.24, 2.36)	24	4 (16.7)	2.00 (0.52, 7.78)
	Employee	45	13 (28.9)	0.79 (0.29, 2.17)	53	16 (31.5)	2.34 (0.77, 7.16)
	Farmer (agriculture or any hard labor)	72	38 (52.8)	1.0 (ref)	72	14 (18.7)	1.0 (ref)
	Unemployed	12	2 (16.7)	0.26 (0.05, 1.39)	12	4 (33.3)	1.29 (0.11, 11.73)

* Odds ratio; 95% confidence interval (CI) adjusted for variables in the model. In the case of smoking tobacco, the associations are shown for male participants only.

Among smokers, the mean (95% CI) number of cigarettes or bidi per day was 9.6 (5.8, 13.4), and packets of cigarettes or bidi per week were 5.3 (4.0, 6.6). Although older people and people with SSC or higher education levels consumed relatively fewer cigarettes or bidi, the results were not significant (Table 3).

Table 3. Numbers of cigarettes and weekly numbers of packets smoked, and their associated factors.

		No. of Cigarettes Smoked per Day		Packets of Cigarettes Smoked per Week	
Characteristics		Mean (95% CI) *	<i>p</i>	Mean (95% CI) *	<i>p</i>
	Total, <i>n</i> = 62	9.6 (5.8, 13.4)		5.3 (4.0, 6.6)	
Age, years	Below 40, <i>n</i> = 5	9.4 (0.1, 19.2)	0.50	7.3 (4.1, 10.6)	0.12
	40–59, <i>n</i> = 34	10.9 (7.8, 13.9)		4.7 (3.6, 5.7)	
	60 years or older, <i>n</i> = 23	8.6 (5.3, 12.0)		3.9 (2.8, 5.0)	
Level of education	No education, <i>n</i> = 20	11.0 (6.5, 15.5)	0.28	5.1 (3.6, 6.6)	0.88
	Primary to high school, <i>n</i> = 30	11.1 (7.3, 14.9)		5.4 (4.2, 6.7)	
	SSC or above, <i>n</i> = 12	6.8 (1.0, 12.7)		5.4 (3.4, 7.4)	
+SES	Poor, <i>n</i> = 18	9.5 (5.3, 14.2)	0.88	5.3 (3.7, 7.0)	0.91
	Middle class or rich, <i>n</i> = 44	9.1 (6.2, 11.9)		5.3 (4.1, 6.4)	
+Occupation	Homemaker, <i>n</i> = 0	–		–	
	Businessperson, <i>n</i> = 9	8.8 (6.2, 11.3)	0.89	5.0 (3.2, 6.9)	0.35
	Employee, <i>n</i> = 13	10.7 (6.4, 15.0)		5.7 (4.1, 7.4)	
	Farmer (Agriculture or any hard labor), <i>n</i> = 38	11.3 (9.1, 13.5)		5.2 (3.7, 6.7)	
	Unemployed, <i>n</i> = 2	7.0 (1.0, 18.1)		1.75 (0, 5.5)	

* Mean (95% confidence interval (CI)) adjusted for variables in the model.

When the smokers were asked to name two diseases that could be caused by smoking, 54 (87%) said cancer and 23 (37%) said heart attack. Only eight (13%) smokers were unable to identify any diseases, indicating that 87% of smokers knew that smoking caused disease (Table 4).

Table 4. Knowledge of smoking-related diseases among 62 adults who smoked tobacco.

Diseases	Number (<i>n</i>)	Percentage (<i>n</i> /62)
Cancer	54	87
Heart Attack	23	37
Tuberculosis	10	16
Asthma	10	16
Stroke	8	13
Do not know	8	13

The questions on intentions, plans, and attitudes about quitting smoking or SLT use showed that more than 70% of the smokers and 60% of the SLT users had thought a lot about quitting. Of the smokers, 89% felt unhappy about being a smoker, and of the SLT users, 72% felt unhappy about being an SLT user. The majority of tobacco users reported that they were willing to cut down at least a little in the next six months. Most of the smokers and SLT users considered that their self-image could increase at least a little by quitting smoking or SLT use; 48% of the tobacco smokers and 26% of the SLT users had tried several times to quit smoking and SLT use, respectively (Table 5).

Table 5. Intention to quit smoking of 62 tobacco smokers and 87 SLT users (participants with high blood pressure).

Intentions about Quitting Smoking Items		Tobacco Smoker, <i>n</i> = 62		SLT User, <i>n</i> = 87	
		<i>n</i>	%	<i>n</i>	%
Thinking about quitting smoking	Not at all	0	0	5	5.7
	A little	16	25.8	30	34.5
	A lot	43	69.4	51	58.6
	Enormously	3	4.8	1	1.1
Feel unhappy	Never	7	11.3	24	27.6
	Sometime	38	61.3	31	35.6
	Often	17	27.4	32	36.8
Six-month plan	Smoking as much	3	4.8	9	10.3
	Cut down a little	40	64.5	48	55.2
	Cut down a lot	15	24.2	21	24.1
	Stop smoking	4	6.5	9	10.3
Stopping smoking will increase self-image	Not at all	5	8.1	2	2.3
	A little	23	37.1	39	44.8
	A lot	32	51.6	44	50.6
	Enormously	2	3.2	2	2.3
Stop smoking at the moment	Not at all	8	12.9	8	9.2
	A little	35	56.5	47	54.0
	A lot	18	29.0	31	35.6
	Enormously	1	1.6	1	1.1
Next four weeks smoking cessation plan	Smoking as much	4	6.5	7	8.0
	Cut down a little	39	62.9	59	67.8
	Cut down a lot	12	19.4	9	10.3
	Stop smoking	7	11.3	12	13.8
Tried to stop smoking	Never	17	27.4	35	40.2
	Once	15	24.2	29	33.3
	Several times	30	48.4	23	26.4

The skewness and Kurtosis of the combined score from the Rasch analysis revealed that a high proportion of people had an average endorsement of quitting smoking. The probability of the intentions, plans, and attitudes about quitting smoking was in the middle of the continuum. The mean (95% CI) probability was 50.4 (39.9, 60.9) for tobacco smoking, indicating that smokers were equally likely to continue or quit smoking. For SLT users, the mean probability of stopping was 64.0 (55.3, 72.7), suggesting that almost two-thirds would probably quit using SLT in the future. Farmers were less likely (probability of 41.6%) compared to employees (probability of 58.9%) to quit smoking, and 75% of people with an SSC-level education or above were likely to quit SLT use compared to 53% of people with no education (Table 6).

Table 6. Intention and attitudes about quitting smoking and SLT use in people who are tobacco smokers ($n = 62$) and SLT users ($n = 87$).

Characteristics	Smoking: Combined Score (%)			SLT Use: Combined Score (%)		
	No. at Risk	Percentage (95% CI) *	<i>p</i>	No. at Risk	Percentage (95% CI) *	<i>p</i>
Total	62	50.4 (39.9, 60.9)		87	64.0 (55.3, 72.7)	
Age, years						
Below 40	5	36.3 (9.3, 63.4)	0.11	6	67.4 (49.3, 85.6)	0.49
40–59	34	53.2 (44.7, 61.8)		43	59.7 (49.8, 69.6)	
60 years or older	23	61.6 (52.4, 70.9)		38	64.9 (55.9, 73.9)	
Level of education						
No education	20	44.8 (32.3, 57.3)	0.13	39	53.2 (42.6, 63.7)	0.02
Primary to high school	30	56.1 (45.5, 66.6)		40	63.8 (54.3, 73.3)	
SSC or above	12	50.3 (34.1, 66.6)		8	75.0 (57.4, 92.6)	
+SES						
Poor	18	50.6 (36.9, 64.2)	0.34	30	61.6 (50.8, 72.4)	0.35
Middle class	44	54.4 (49.3, 59.5)		57	66.4 (57.3, 75.5)	
+Occupation						
Homemaker	0	–	0.01	51	55.7 (46.8, 64.6)	0.28
Businessperson	9	50.7 (35.6, 65.9)		6	72.9 (52.3, 93.6)	
Employee	13	58.9 (45.1, 72.6)		16	62.1 (49.3, 74.9)	
Farmer (Agriculture or any hard work),	38	41.6 (29.4, 53.9)		12	65.3 (50.4, 80.2)	
Unemployed	2	56.4 (49.5, 63.2)		2	51.4 (31.5, 69.5)	

* Mean (95% confidence interval (CI)) adjusted for variables in the model.

Smokers who could not mention any diseases caused by smoking were less likely to quit smoking (44% vs. 54%, $p = 0.14$) than those who could name two diseases.

The tobacco smokers were asked to mention the names of two diseases that are associated with tobacco smoking.

4. Discussion

The key elements for successful smoking cessation are people's knowledge of the detrimental effects of smoking and their intentions or motivation for quitting smoking. The critical findings of this study are that most people know the detrimental effects of smoking, but based on a combined score from seven items related to quitting smoking, it is only 50% probable that people are willing to quit or plan to quit smoking. Compared to smoking, people are more likely to quit SLT use. Younger people, people with a low level of education, and farmers are less likely to quit smoking. However, younger people, along with people with a higher level of education, and businesspersons are more likely to quit using SLT.

In this study, the prevalence of current smoking was the highest in people aged 40–59 years and in people who had below a secondary school certificate (SSC) level of education. The higher prevalence of smoking in those 40–59 years of age indicates that most smokers are in the workforce, and this includes daily laborers or landowners, who have a higher prevalence of tobacco smoking [34,43,45]. The lower prevalence of smoking later in life, especially after 60 years of age, may be associated with poorer health, which is expected during the later stages of the lifespan. This may motivate people to stop smoking or to switch to other forms of tobacco consumption, such as SLT use. We found smokeless tobacco use was higher among people aged 60 years or older. Another reason older people have lower smoking rates is that people who smoke are more likely to die before they reach old age [62]. High rates of mortality in tobacco smokers can simultaneously account for decreased smoking prevalence and increased SLT use in older adults [34,35,43,45]. The lower percentage of tobacco smoking among older adults is also influenced by the fact that

those who smoke tobacco are more likely to be successful at quitting smoking due to other health problems [63].

In this study, the overall intention to quit smoking or plans or efforts to quit smoking was in the middle of the continuum (50.4%), which is similar to previous findings [24,58,64–67]. For example, 52% of Hong Kong Chinese planned to quit [67], and 49.5% of men in a U.S. study [65] were willing to quit smoking. However, our study showed a lower percentage of people reporting their intention to quit smoking compared to some other studies. Of Korean adult smokers, 75% were planning to quit [68], and 65 to 81% of smokers in many developed Western countries intended to quit smoking [69]. The Global Adult Tobacco Survey (GATS) [24] and the International Tobacco Control (ITC) Policy Evaluation Bangladesh Survey [49] have reported that 51.4% of male participants and 36% of all participants, respectively, had planned to quit smoking. The GATS and ITC [24,49] were conducted among smokers aged 15 years or older after running a smoking cessation campaign for one year to determine the factors associated with quitting smoking. Although our study found a higher proportion of people with an intention to quit smoking than the ITC [49], it was similar to or lower than that in other studies [24,58,64–69]. The proportion intending to quit smoking in our study could be considered very low given that the participants all had chronic hypertension. Quitting smoking has substantial health and social benefits. It dramatically improves blood circulation in vascular systems and lung function, dramatically drops the risk of heart attack, stroke, and cancer, and increases overall physical fitness. Stopping smoking can improve personal lives, which greatly impacts overall well-being [70]. The current research provides an initial picture of the sociodemographic factors associated with the number of cigarettes smoked and intentions to quit in adults in rural Bangladesh. The findings suggest that occupations requiring manual work and people with a lower level of education have low awareness of the harmful effects of smoking. The research demonstrates a need for appropriate interventions for improving motivation to quit smoking and SLT use.

In the ITC, participants who intended to quit smoking within one year were younger and with or without any chronic diseases. There are several reasons our study found a lower percentage of people with intentions to quit smoking. In this rural Bangladesh community, there is a lack of public health campaigns focusing on the benefits and harms of quitting smoking, smoking cessation programs (e.g., a quit line or clinic), and available smoking cessation medications. The low rate of quitting intention among Bangladeshi adults may be associated with the lack of policy initiatives that could encourage smokers to think about quitting. In Vietnam, tobacco control interventions, such as stipulating places where smoking is not allowed, applying health warnings in text and pictures on cigarette packs, and completely banning tobacco advertising, promotion, and sponsorship, significantly increased the intention to quit smoking [58].

In our study, the proportion intending to quit smoking did not differ significantly across age groups or other socio-demographic factors. However, it was lower among younger age groups, which is consistent with previous studies in Bangladesh [49] and elsewhere [24,58,65] but opposite to the results of other studies [24,71]. Since age is a crucial predictor for starting to smoke or willingness to quit smoking, tobacco control strategies could include intense efforts to disseminate knowledge of the harmful effects of smoking among school and college students to stop them from ever smoking. Another strategy would be to introduce targeted tobacco cessation interventions to increase cessation rates among those who already smoke. A previous study [58] reported that if people are exposed to media channels, obtain information about the harmful effects of smoking, or are encouraged to quit smoking, they are more likely to intend to quit. In our study, the association between a younger age and a lower intention to quit smoking may be partially explained by the fact that no targeted tobacco cessation intervention programs are being conducted in the area [72]. A lower percentage of smoking cessation in younger people may also be because they perceive themselves as less vulnerable to smoking harms or are not concerned about smoking harms [73]. Overall, our study participants were older than

in previous studies [24,49,58] and have hypertension, so the lower percentage with no intention to quit smoking is alarming.

The association of having a higher education with quitting smoking and SLT use in our study is in line with previous studies [25,58,67]. A previous study reported [25] that professional people quit smoking almost eight times more often than people with manual labor occupations. In our research, most of the farmers were smokers, and the proportion of them intending to quit smoking was significantly lower than the proportions among other professions. This association may be confounded by the fact that farmers, especially in most Asian countries, are less educated than those working in other professions [74]. Due to their low level of education, it is possible that they are less exposed to media or any health promotion programs for smoking cessation. This highlights the need for mass media anti-smoking messages and to conduct motivational programs for quitting smoking and SLT use, targeting those with low education levels in a community [60]. One-time education programs or focus group discussions, especially among people with low levels of education, can also help in the cessation of smoking tobacco and SLT use [38].

The number of cigarettes smoked has been reported to be associated with quitting smoking, and age has been shown to be a predictive factor of the number of cigarettes smoked [75]. In our study, none of the socio-demographic characteristics were found to be associated with the number of cigarettes smoked. However, in general, middle-aged people were found to smoke more than younger and older people. Among the younger people, the range of the number of cigarettes they smoked encompassed both the lowest and highest numbers. The fewest cigarettes were smoked by people with an SSC-level education or above. Our results contradict previous findings, where being older was associated with smoking a larger number of cigarettes per day [75].

Across Bangladesh, the prevalence of smoking varies from 23% to 60%, and the current study reports that 40% of adults were smokers and smoked about ten cigarettes per day and five packets of cigarettes per week [3,39,43]. Although the prevalence of current smokers in Bangladesh is high [3,39,43], the number of cigarettes smoked is reasonably low. For example, in Australia, the prevalence of current smokers in people aged 44–53 years is 13.6%, with a steady increase in the number quitting smoking. However, the current smokers in that age group smoke more than 20 cigarettes per day [75]. In the USA, the prevalence of smokers is 23%, of whom more than 50% smoke more than ten cigarettes, and 2% smoke more than 40 cigarettes per day [76]. One of the standard methods of quitting smoking is gradually reducing the number of cigarettes smoked per day before stopping completely [58,77,78]. This approach might be effective in Bangladesh, as the smokers are starting with a lower number of cigarettes per day, so they may be able to wean off quickly.

Our study has several strengths, including the in-person data collection. We also applied Rasch analysis to compute combined scores to report the overall intentions of quitting smoking, which gives a broader measure of the intention to quit than any specific item-related intention. However, the major limitation of this study is that the number of smokers and SLT users was small, which limited our ability to draw any significant conclusions. Because the data were collected through face-to-face interviews during the COVID-19 lockdown, the level of interaction between the participants and the data collectors may have been impacted. There may have been response bias due to the variation in education and skills and gender differences, but the data collectors were well-trained to minimize this. Future intervention studies to address the intention to quit smoking, SLT use, and actual outcomes are warranted. This study was conducted in a single district, limiting the generalizability to the national level. However, the rural population in terms of its socio-demographic and education levels is similar to that of Bangladesh [79].

5. Conclusions

The study aimed mainly to investigate the factors associated with the number of cigarettes smoked per day, awareness of the detrimental effects of smoking on health, and intention to quit tobacco use. Generally, people were aware of the detrimental effect of

smoking. More than 90% of people knew that smoking was associated with cancer, and more than two-thirds of the participants felt unhappy about being a smoker or an SLT user. Younger people and farmers had less intention to quit smoking than their counterparts. A combined score of all the intention items produced using Rasch analysis found that half of the people had the intention to quit smoking tobacco and less than two-thirds intended to quit SLT use, while having a higher education was positively associated with these outcomes. Public health campaigns and health education programs should be implemented to increase the motivation to quit smoking, especially among farmers and people with a lower level of education. Since the study was conducted in a small area in Bangladesh, a large and nationally representative sample is needed to substantiate the conclusions.

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Institutional Review Board Statement: The Swinburne University of Technology Human Research Ethics Committee (Review reference: 20202723-5020) approved the study. All data collection methods, data management, and analyses were performed in accordance with the relevant guidelines and regulations of the institution. The investigators provided written information about the project to the participants. The participants were given the option to discuss the project with the local investigators. The local investigators verbally discussed the project with those who were unable to read or illiterate before collecting their informed consent. All participants were above 18 years of age. The participants were informed that they had full rights to withdraw from the study at any stage if they wished. They were also informed that their decision to participate or not would not influence their relationship with ORCD. Written informed consent was obtained from all subjects.

Informed Consent Statement: Not applicable.

Data Availability Statement: The corresponding author will make the data used for this study available upon reasonable request.

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Abbreviations

ORCD: Organization for Rural Community Development; SLT: smokeless tobacco; SES: socioeconomic status; RCT: randomized control trial; SSC: secondary school certificate; CI: confidence interval; OR: odds ratio.

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