**Original research**

# Factors associated with initiation of tobacco smoking among schooling adolescents in the age group of 13 – 15 years in the Kandy district, Sri Lanka

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**Abstract**

Adolescent smoking problem has still remained a public health concern, but factors that contribute to the initiation of adolescent smoking are not well-known in Sri Lanka. The study aimed to determine the factors associated with the initiation of tobacco smoking among schooling adolescents in government schools in the age group of 13-15 years in the Kandy district. A cross-sectional study was conducted in selected government schools of Sinhala, Tamil, and English mediums in the Kandy district. The subjects were selected using a stratified multi-stage cluster sampling method. A pretested self-administered questionnaire was used. The factors associated with the initiation of smoking were determined by a multivariable analysis using logistic regression.

A total of 1395 students (Male 52.9%) were included in the study. The initiation of tobacco smoking was significantly associated with being a male student (Adjusted Odds ratio (AOR)=26.24; 95% CI=7.49-91.44), the parent being a smoker (AOR=6.04; 95% CI=2.83-12.91), education level of a father below GCE O/L (AOR=5.65; 95% CI=2.20-14.49), education level of mother below GCE O/L (AOR=2.63; 95% CI=1.18-6.25), presence of household member who smokes (AOR=7.10; 95% CI=2.76-18.29), social network use (AOR=10.73; 95% CI=3.63-31.75) and the parent being a quitter (AOR=0.29; 95% CI=0.11-0.79). Factors identified for smoking initiation give a clue to intervene in the target population focusing family related and other modifiable factors.

## Introduction

Tobacco smoking most often starts in adolescence, hence understanding of predicting factors for smoking initiation during this period is essential for applying successful preventive measures [1]. The early age of initiation of smoking is a new trend that has been noticed especially in developing countries [2]. Initiation of smoking in early adolescence (10 – 14 years) has been shown to be associated with greater nicotine dependence and more harmful social and health outcomes compared to those who start smoking later in life [2]. It has been

shown that one-third of adult smokers who start smoking as teenagers are at high risk of premature death in adult life due to tobacco smoking-related diseases [3].

Studies conducted on tobacco smoking among adolescents in Sri Lanka show that there is a recent trend in the early age of initiation of tobacco smoking among adolescents [1]. This highlights the need to start tobacco control education at a very young age. The Report on Global Youth Tobacco Survey (GYTS) of Sri Lanka predicts the susceptibility to tobacco use by a never smoker in the future as 2.5% (95% CI=1.6-3.9) [1]. The national survey on emerging issues among adolescents in Sri Lanka, reported that the majority of adolescents in Sri Lanka had started substance abuse behaviours at the age of 14-15 years [4]. However, recent surveys conducted by WHO show that there is a recognizable trend of age at initiation of smoking shifting towards early adolescence [1,5]. According to the Global Youth Tobacco Survey ) conducted in Sri Lanka in 2015, 66% of current smokers had tried their first smoking at the age of 13 to 15 years [1]. It suggests an early age of initiation of smoking. Also, it emphasizes the importance of identifying factors associated with the initiation of smoking and the need for implementing educational strategies at a very young age in Sri Lankan adolescents.

A variety of associated factors for the initiation of smoking has been described in the literature including individual factors, family and social background-related factors, and influence by the media. Literature shows individual or intrapersonal factors such as perceived mental health status [6,7], body image [7,8], low academic achievement [7,9], lack of cigarette refusal skills, low self-esteem [7,9], high perceived benefits of smoking [6-8], low perceived risks of smoking including perceived behavioural control [7,8], are associated with early initiation of tobacco smoking. Also, Interpersonal factors such as family disunions [10], low parental educational status [7,10], low socioeconomic status [9,10], smoking by siblings, lack of parental involvement [10], and family approval of smoking as a habit [10,11] have shown to be significantly associated with the initiation of smoking. Peer pressure [10,12], access to tobacco products [12], perceptions that tobacco use is normative [10], the attraction of the opposite sex [7], stressful academic environment, and socialization of events with tobacco [7] are the other commonly associated factors with the initiation of tobacco smoking among schooling adolescents. Most of the above findings were reported from Asian and South-East Asian countries. Also, media influence remains a major factor

associated with the initiation of smoking in early adolescence [13] Perry [14] highlights the need for and the importance of researching tobacco use among adolescents as they are a key target group of the tobacco industry that uses media effectively for promotions [14].

For the current study, Kandy district was selected as it had a mix of urban and rural sector schools as well as plantation sector schools. Students in different sectors may elicit different characteristics of tobacco smoking. Therefore, the Kandy district student population had a good blend of students from different sectors which provides more generalizability of results thus increases external validity of the study [15].

The current study was aimed to examine the factors associated with the initiation of tobacco smoking among schooling adolescents in government schools in the age group of 13-15 years in the Kandy district which will provide evidence for policymakers who are involved with the prevention of tobacco smoking especially in education, health and legal sectors.

**Methods**

*Study type:*

A Cross-sectional analytical study

*Study setting:*

The study was conducted in a representative sample from all government sector schools in the Kandy district which have Grades 8 and 9 (Students of the age group of 13 – 15 years).

*Study duration:*

The study period was six months.

*Study population:*

Student of the age group of 13-15 years studying in grade 8 or 9 in a government school in Kandy district was selected as the study unit. The functional types of schools included in the study were the type 1AB, 1C, and type 2 according to the classification of the Ministry of Education, Sri Lanka. There were 437 schools having grade 8 or 9 classes in Kandy district according to the above functional categories (Type 1AB=60, 1C=161, Type 2=216) with a total of 38432 students studying in grades 8 and 9 [15].

*Sampling technique:*

A multistage stratified cluster sampling technique was used. The stratification of schools was according to the

functional types of schools based on the latest registry available [15]. As the probability proportionate to the size of the population technique was considered, the representation of all types of schools was guaranteed as well as the representation of an adequate number from each category. The minimum sample size for the study was calculated using the formula for calculating a population proportion with absolute precision and it was 1427 [16]. A class of students in grades 8 and 9 in government schools was considered as a cluster. The number of students in grade 8, and 9 classes have a great variation across the category of school. Therefore, the cluster size was determined according to the category of school. In the final sample, there were 1395 (3.7% of the total study population) students.

### Development of the study instrument:

A self-administered structured questionnaire was used to collect data. The questionnaire consisted of Interpersonal, intrapersonal, and media-related factors for the initiation of tobacco smoking from previous questionnaires used in international, regional, and local studies. The validity of the questionnaire was ensured by assessing the face validity, content validity, and consensual validity by a multi-disciplinary panel of experts in the fields of Community Medicine, the field of tobacco and alcohol prevention, education, and language specialists of Sinhala and Tamil.

### Data collection:

The questionnaire was pre-tested among students in similar grades (n=62) in selected schools in another district. Data was collected by trained data collectors under the supervision of the Principal Investigator. Apart from the measures undertaken to ensure the quality of data at design stage of the questionnaire, by usage of standardized instructions at the stage of data collection and minimizing the amount of missing responses at site with a pre-informed scheduled time allocated for the data collection process with agreement of schools quality of data collected was ensured.

***Data analysis:*** Factors associated with the initiation of tobacco smoking among students were analyzed using the chi-squared test for the bivariate component. Variables that were significantly associated with the initiation of smoking in bivariate analysis were included in a multivariable analysis. Multivariable analysis was performed using binary logistic regression. Students who had initiated smoking at any age and smoked tobacco at

least once in life were considered in the analysis as initiators[1].

***Ethical clearance and consent:*** Ethical clearance was obtained from the Ethical Review Committee of the Faculty of Medicine the University of Peradeniya. Informed consent was obtained from each participant with an ascent from the parents of each participant.

## Results

Of the 1427 students approached, 1395 (97.1%) responded. Of the respondents, 84 (6.0%) have smoked before. Of them, 50 (59.5%) had initiated smoking at the age of 12 to 13 years. The details of the study sample are described in Table 1.

Bivariate analysis was conducted at the initial phase of the analysis. Factors which resulted significantly associated with initiation of smoking are described in the Table 2.

In the bivariate analysis, 14 factors were found to be significantly associated with the initiation of tobacco smoking. Since ethnicity and religion (Zero smokers in Muslim / Islam) had a low number of observations they were not included in the multivariable analysis. Students of Muslim ethnicity had a significantly higher likelihood of not initiating tobacco smoking compared to the other ethnicities (OR=1.071; 95%CI=1.055–1.087). None of the Muslim students (All belonging to the Islam religion) had initiated smoking. Considering the behaviour of those who have initiated smoking among the students in the current study, the majority of the initiators believed that smoking would not harm them (33.8%, n=28).

Multivariate analysis was conducted adding the 12 variables that were found to be significantly associated with the initiation of tobacco smoking. The results of the multivariate analysis are shown in Table 3.

Sex, Educational status of father and mother below GCE Ordinary Level exam in Sri Lanka, smoking parent at home, presence of household smokers other than parents, and social network use were significantly positively associated with smoking initiation. The presence of a parent who has quit smoking significantly reduced smoking initiation of smoking.

## Discussion

Our findings show the majority of the factors associated with the initiation of smoking in this age group were sociodemographic factors. The unique feature identified was that except for the gender and educational status of the parents, others were modifiable associated factors.

Modifiable factors associated positively with the initiation of smoking among this age group were smoking parents at home, the presence of household smokers other than parents, and social network usage.

**Table 1**: The socio-demographic characteristics of the sample

| Characteristic | Frequency (%) |
| --- | --- |
| **Sex (n=1395)** | |
| Male | 738 (52.9) |
| **Ethnicity\* (n=1379)** | |
| Sinhala | 1020 (74.0) |
| Tamil | 233 (16.9) |
| Muslim | 126 (9.1) |
| **Religion\* (n=1382)** | |
| Buddhism | 970 (70.2) |
| Hindu | 223 (16.0) |
| Islam | 125 (9.0) |
| Christian | 64 (4.6) |
| **Level of education of the father\* (n=1369)** | |
| up to GCE O\L | 156 (11.4) |
| beyond GCE O\L | 1213 (88.6) |
| **Level of education of the mother\* (n=1372)** | |
| up to GCE O\L | 204 (14.9) |
| beyond GCE O\L | 1168 (85.1) |
| **Social class\*\* (n=1395)** | |
| I | 375 (26.9) |
| II | 471 (33.8) |
| III | 273 (19.6) |
| IV | 202 (14.5) |
| Va | 54 (3.8) |
| Vb | 20 (1.4) |

\*Total is less than 1395 due to missing values
\*\*The social class of the family was categorized according to Barker and Hall's social class classification (17).

The presence of a parent who has quit smoking significantly reduced smoking initiation of smoking. Also, univariate analysis showed that ethnic and religious background was also significantly associated with the initiation of smoking. In the current study, none of the Muslim students had ever smoked.
Our findings indicate factors associated with the initiation of tobacco smoking in this age group include sociodemographic factors, family-related factors, and especially the factors related to media use. These factors are associated with the ethnic, religious, and cultural

background of adolescents and are known to play a major role in risks associated with their smoking behaviour [18] In the current study, none of the Muslim students had ever smoked. It was a significant finding in the bivariate analysis. Alagiyawanna et al [19] conducting a cross-sectional study on second-hand smoking in the Colombo district Sri Lanka among students of age group 14 to 15 years, reported that non-Sinhalese ethnicity was not significantly associated with higher odds of being exposed to second-hand smoke at home ($\chi 2$=1.24, p=0.27) [19]. This finding implies that non-Sinhalese ethnic students have less exposure to tobacco smoke at home and tobacco smoking at home by family members may be less in non-Sinhalese ethnicities compared to Sinhalese. This may influence the lower initiation of tobacco smoking among non-Sinhalese students. Based on the Sri Lankan Global School-Based Health Survey Senanayake et al [20] reported factors such as having parents who smoke and seeing actors who smoke in media as significantly associated correlates with tobacco smoking and they do not describe ethnic differences or religion being factors [20]. Perera and Gunawardena [21] conducted a cross-sectional study on tobacco promotional activities in the Polonnaruwa district, Sri Lanka which included students of mean age of 14.9 years (SD = 0.37) from multiple ethnicities do not report ethnic or religious differences in factors associated with good knowledge of tobacco promotional activities [21]. These shreds of evidence from Sri Lanka show that ethnic and religious variances may play a role in the initiation of tobacco smoking and further research is warranted in the future. Considering the global literature, a systematic review conducted by Rew and Wong [18] shows that religiosity/spirituality can have positive effects on adolescents' health attitudes and behaviours, including tobacco smoking [18]. A randomized controlled trial conducted in Indonesia showed that both health and Islamic school-based smoking prevention programmes provided positive effects among adolescents and they concluded that tailoring programme interventions with participants' religious background may provide additional benefits in smoking-focused interventions [22].

The unique feature identified among the sociodemographic and family-related factors was that except for the gender and educational status of the parents, others were potentially modifiable factors. This further explains the need for a proper intervention to change the behaviour of students which could start from schools. Korean cross-sectional study conducted in 2015 among 74186 college students aged between 12-18 years

showed father's education, mothers' education, and family approval not given for smoking were significantly associated with the initiation of smoking [7]. The above study had a 2.31 times higher likelihood of initiation of smoking by being a male compared to females. Karimy et al [6] reported presence of smoking siblings at home, and smoking parents as important predictors of smoking in a study conducted among 365 adolescents aged 15 to 19 years in Iran.

**Table 2**: The results of the bivariate analysis of factors affecting initiation of tobacco smoking among school students in the age group of 13 to 15 years.

| Factor | Ever smokers N (%) | Never smokers N (%) | Total N (%) | Odds ratio (OR) with Level of significance |
|---|---|---|---|---|
| **Sex (n=1395)** | | | | |
| **Male** | 78(10.6) | 660(89.4) | 738(100.0) | 11.573 (5.078 – 26.374) |
| **Female** | 6(0.9) | 651(99.1) | 657(100.0) | P < 0.0001 |
| **The educational level of the father (n=1369)** | | | | |
| **Below O/L** | 26(16.7) | 130(83.3) | 156(100.0) | 3.744 (2.418 – 5.796) |
| **Beyond O/L** | 54(4.5) | 1159(95.5) | 1213(100.0) | P < 0.0001 |
| **The educational level of the mother (n=1372)** | | | | |
| **Below O/L** | 23(11.3) | 181(88.7) | 204(100.0) | 2.270 (1.434 – 3.595) |
| **Beyond O/L** | 58(5.0) | 1110(95.0) | 1168(100.0) | P < 0.0001 |
| **Type of school (n=1395)** | | | | |
| **Type 2** | 17(11.9) | 126(88.1) | 143(100.0) | 2.221 (1.343 – 3.675) |
| **Others** | 67(5.4) | 1185(94.6) | 1252(100.0) | P = 0.002 |
| **Social class (n=1395)\*** | | | | |
| **Category 1 (Lower)** | 30(10.9) | 246(89.1) | 276(100.0) | 1.068 (1.023 – 1.115) |
| **Category 2 (Higher)** | 54(4.8) | 1065(95.2) | 1119(100.0) | P < 0.0001 |
| **Parental smoking (n=1264)** | | | | |
| **Yes** | 42(19.9) | 169(80.1) | 211(100.0) | 5.112 (3.413 – 7.658) |
| **No** | 41(3.9) | 1012(96.1) | 1053(100.0) | P < 0.0001 |
| **Presence of a parent who has quitted (n=973)** | | | | |
| **Yes** | 20(15.5) | 109(84.5) | 129(100.0) | 0.865 (0.803 – 0.933) |
| **No** | 20(2.4) | 824(97.6) | 844(100.0) | P < 0.0001 |
| **Presence of a smoking household member (n=1264)** | | | | |
| **Yes** | 22(25.6) | 64(74.4) | 86(100.0) | 4.860 (3.148 – 7.504) |
| **No** | 62(5.3) | 1116(94.7) | 1178(100.0) | P < 0.0001 |
| **Internet use: Yes (n=1360)** | | | | |
| **Yes** | 53(14.6) | 310(85.4) | 363(100.0) | 4.696 (3.065 – 7.194) |
| **No** | 31(3.1) | 966(96.9) | 997(100.0) | P < 0.0001 |
| **Social network use (1332)** | | | | |
| **Yes** | 39(29.1) | 95(70.9) | 116(100.0) | 7.748 (5.247 – 11.442) |
| **No** | 45(3.8) | 1153(96.2) | 1279(100.0) | P < 0.0001 |
| **Seen protobacco advertisements in visual media (n=1308)** | | | | |
| **Yes** | 32(12.6) | 221(87.4) | 253(100.0) | 2.566 (1.689 – 3.899) |
| **No** | 52(4.9) | 1003(95.1) | 1055(100.0) | P < 0.0001 |
| **Seen Anti-tobacco advertisements in visual media (n=1317)** | | | | |
| **Yes** | 17(11.3) | 133(88.7) | 150(100.0) | 0.941 (0.887 – 0.998) |
| **No** | 67(5.7) | 1100(94.3) | 1167(100.0) | P = 0.008 |

\* Six types of social class were divided into two categories top 3 classes into the higher category and the lower 3 into the lower category [17].

This study reported the mean age of smoking experimentation as $13.2 \pm 1.9$ years. Furthermore, 59.4% of the subjects had initiated smoking before the age of 13 years[6]. In the current study, out of the 84 ever smokers, 59.5% (n=50) had initiated smoking at the age of 12 to 13 years. The factors of initiation of smoking in our

study share similarities with the Asian studies mentioned above. Considering the current study and past studies in Sri Lanka [1,18,21] and in the Asian region the initiation of tobacco smoking among adolescents seems to be influenced by the domestic family environment.

Considering the current study and the studies conducted in the past, it is acceptable to interpret that parents who smoke serve as models for the behaviour of their children.

**Table 3**: The results of stepwise logistic regression of factors affecting initiation of tobacco smoking among school students in the age group of 13 to 15 years.

| Factor | B | SE | P | Adjusted Odds Ratio (95% CI) |
|---|---|---|---|---|
| **Sex: Male** | **3.267** | **0.640** | **<0.0001** | **26.236 (7.486-91.44)** |
| **Type of School: Type 2** | 0.093 | 0.093 | 0.881 | 1.097 (0.326-3.688) |
| **Education status of father: Below O/L** | **1.732** | **0.481** | **<0.0001** | **5.650 (2.203-14.49)** |
| **Education status of mother: Below O/L** | **0.967** | **0.441** | **0.028** | **2.630 (1.107-6.248)** |
| **Social class: Lower** | 0.073 | 0.514 | 0.171 | 2.020 (0.738-5.529) |
| **Parental smoking: Yes** | **1.798** | **0.387** | **<0.0001** | **6.040 (2.827-12.91)** |
| **Parental quitter: Yes** | **-1.242** | **0.517** | **0.016** | **0.289 (0.105-0.795)** |
| **Household smoker: Yes** | **1.960** | **0.483** | **<0.0001** | **7.103 (2.757-18.29)** |
| **Seen protobacco advertisements: Yes** | -0.396 | 0.527 | 0.452 | 0.673 (0.240-1.890) |
| **Seen anti-tobacco advertisements: Yes** | 0.489 | 0.517 | 0.344 | 1.630 (0.592-4.489) |
| **Internet use: Yes** | 0.821 | 0.541 | 0.129 | 2.272 (0.787-6.560) |
| **Social network use: Yes** | **2.373** | **0.553** | **<0.0001** | **10.729 (3.626-31.75)** |

*B= Beta coefficient, SE= Standard Error, P=Level of significance OR=Odds ratio O/L=Ordinary Level*

*Initiation of smoking (age 13-15 year old student) = 1.672($\beta°$) + 3.267 X Male + 1.732 X Education status of father below O/L + 0.967 X Education status of mother below O/L + 1.798 X Parental smoking + 1.960 X household smoker + 2.373 X social network use – 1.242 X Parental quitter at home*

Also, the male gender is associated with high initiation rates and our results are consistent with earlier studies on this observation [1,21]. Observation of low initiation rates among females can be attributed to the cultural factors discouraging females from getting into the habit of tobacco smoking.

Although legal measures have been implemented via the Act of National Authority on Tobacco and Alcohol (NATA act) of Sri Lanka, the media influence, especially social media plays a significant role in the initiation of tobacco smoking according to the current study findings. Although the significant role of mass media on adolescent smoking was described previously in Sri Lankan studies it seems to be persisting and preventive strategies may need a close look [1,19].

Tobacco promotion activities targeting adolescents through social media have to be addressed. The Article on tobacco advertising, promotion, and sponsorship in NATA act (Article 5:3) needs to be considered for

revision with the inclusion of social media as an identified source of tobacco promotion [1]. Schooling adolescents need continuous vigilance towards tobacco promotions by media and trade. Therefore, it can be recommended to start a tobacco surveillance system to report, track, and share the tobacco promotional efforts and learn from them to prevent initiation at an early age.

**Limitations**

Self-reporting of tobacco use is shown to be under-estimated due to social desirability bias [23]. Since smoking is stigmatized in Sri Lankan communities this fact may apply to this study as well. However, self-administered questionnaires may have reduced the bias. Also, factors associated with initiation may have under-reported due to the above fact and the age category of the subjects. Since, the age group is 13 to 15 years, adding to social stigma, fear of exposing facts in the customary school-based education system may have further led to underestimates. However, to minimize these, the

following methods were used. Students were reassured by the data collectors before administering the questionnaires on the purpose of the study and confidentiality of the data collected added to the information sheet and assent form given. Smoking status was asked in an indirect way, obtaining data for types of tobacco used instead of asking directly whether they use tobacco or not. Standard questions that were used in GYTS surveys were included. However, there is still a probability to get underestimates. This is a limitation of our study. Since most global and local surveys are conducted using self-reported data this limitation may not affect the comparison of associated factors of initiation of smoking in literature with the current study.

## Conclusions

It is safe to conclude that associated factors of the initiation of smoking including intra-personal factors, family-related factors, and media influence which need to be addressed. These findings can be used to advocate policymakers and programme managers, especially in the education and health sectors. Also, these findings can be used to guide tobacco control intervention designs in the future.

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## Author contributions:

## Conflicts of interests:

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## Data availability:

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