Original Article

Smoked tobacco dependence and its correlates among participants attending life skills training and counselling services programme across Karnataka (2017–2022)

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Abstract

Introduction: Indian National Mental Health Survey reports an alarming prevalence of 20.9% for tobacco dependence in India. Dependence on smoked tobacco can be prevented by thorough knowledge of the risk factors associated with it. **Objectives:** To estimate the prevalence and identify the factors associated with smoked tobacco dependence among participants attending the life skills training and counselling services programme (LSTCSP) across Karnataka from 2017 to 2022. **Materials and Methods:** Pretraining data of 3104 participants from training programmes between 2017 and 2022 were utilised. Univariate and multivariable logistic regression analysis was performed based on a conceptual framework with various hypothesised exposure variables and smoked tobacco dependence as outcome. **Results:** The overall prevalence of smoked tobacco dependence among LSTCSP participants who used smoked tobacco products was 59.4%. Ever use of smokeless tobacco products (Adjusted odds ratio (AOR) =2.05, 95% CI: 1.11–3.78) and screening positive for symptoms of generalised anxiety (AOR = 2.53, 95% CI: 1.32–4.84) significantly increased the odds of smoked tobacco dependence, whereas making decisions collectively in the family (AOR = 0.35, 95% CI: 0.18–0.66) and individuals with increased score for neurotic personality traits (AOR = 0.64, 95% CI: 0.44–0.93) were the factors associated with reduced odds of smoked tobacco dependence. **Conclusion:** The identified risk factors associated with smoked tobacco dependence are important to develop tobacco control programmes as well as in preventing its onset. With the risk factors for smoked tobacco dependence identified, the results of this study have implications for health promotion and prevention programmes as well as cessation programmes related to smoked tobacco dependence, within India and similar countries.

Keywords: Health promotion, life skills, mental health, personality traits, smoked dependence

Introduction

Tobacco is one of the major substances that is widely used in India.[1] It is associated with various adverse health effects, and every year, more than 8 million people die from tobacco use globally.[2] It accounts for 1.35 million deaths every year in India.[2] Adverse effects of tobacco not only result in loss of lives but also in financial consequences. In India, the total economic cost of tobacco use from all diseases in the year 2017–18 accounted for nearly 27.5 billion USD.[2] Nicotine, the main psychoactive compound in tobacco, is responsible for reinforcing smoking and tobacco use behaviours, establishing and maintaining

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its dependency.[3] According to the National Mental Health Survey (NMHS) of India 2015–16, India registers an estimated 20.9% current prevalence of any level of dependence on tobacco among adults.[4] Dependence on tobacco manifests with various physiological and psychological symptoms[5] and becomes evident by withdrawal symptoms such as anxiety, irritability, and stress.[6] Once dependence is developed, it requires continuous reinforcement to quit smoking. It was observed that around 80% who attempt to quit smoking on their own, return to smoking within a month.[6]

Although the prevalence of smoking has reduced globally, the dependence on smoking may remain due to difficulty in quitting smoking.[7] Understanding various factors associated with smoked tobacco dependence is important for developing cessation programmes as well as in preventing its onset. This knowledge of factors affecting smoking dependence shall provide an opportunity for primary prevention including health promotion which is best done at the level of primary care providers and family physicians. Smoked tobacco dependence is believed to be influenced by a number of factors, including socio-demographic, economic, and individual level factors. Additionally, quality of life, life skills, work environment, job satisfaction, and psychological issues (such as anxiety, depression and attempt of self -harm) are hypothesised to play a role in developing dependence on smoked tobacco. However, these remain untested mostly due to a lack of such data. Life skills training and counselling services (LSTCSP) programme is complementary to programme YuvaSpandana, a youth mental health promotion programme in the state of Karnataka.[8,9] This programme provides an opportunity to test the influence of these factors on smoked tobacco dependence. By utilising the pretraining data of participants attending this state-wide programme (LSTCSP), this study aims to estimate the prevalence and identify the factors influencing dependence on smoked tobacco products among those who had ever used smoked tobacco.

Materials and Methods

We performed a cross-sectional data analysis of pretraining data of participants trained under the LSTCSP programme between 2017 and 2022. The study was conducted for a period of 4 months from June 2022 to September 2022. The pretraining data were obtained from the Computerised Management Information System specifically developed for LSTCSP. Data of 3104 participants who attended 108 training across Karnataka were utilised for this study. The participants of the LSTCSP programme were recruited through deputation from various colleges across Karnataka. Data for LSTCSP were collected through a self-administered pretraining questionnaire, which had 399 questions across 25 sections. This included details pertaining to socio-demographic and economic characteristics, family environment, behaviour related to chewing and smoking tobacco, consuming alcohol, sniffing and injecting drugs, physical activity, job satisfaction and work environment, peer characteristics, personality traits, level of life skills and quality of life.[10] Considering this, a conceptual framework [Figure 1 in Supplementary File] was developed based on literature review and expert opinion, for hypothesised exposure variables for smoked tobacco dependence. Broadly, this includes sociodemographic, economic and dietary factors, health-related factors and individual factors. Smoked tobacco dependence was considered among participants who ever used smoked tobacco products and was assessed using CAGE questionnaire modified for smoking behaviour.[11]

Statistical analysis

Multivariable logistic regression analysis was performed with smoked tobacco dependence as an outcome and variables in the conceptual framework as potential exposures. All hypothesised exposure variables significantly associated with the outcome at 10% level ($P < 0.10$) in univariate analysis were considered to be included in the final model using a forward-stepping process. Variables that are significant at 5% level ($P < 0.05$) and those which changed the odds ratio of at least one exposure variable by 10% were eligible to be retained in the final model. The significance of addition of each exposure variable into the model was tested using the likelihood ratio test. Goodness of fit for the final model was assessed using Hosmer–Lemeshow χ^2 test followed by fitting area under the curve. The data analysis was performed using STATA version 16.[12] Ethical clearance for this study was obtained from Institutional Ethics Committee (IEC) vide letter number NO. NIMH/DO/IEC (BS and NS DIV)/2022 dated 23.06.2022. Signed informed consent was taken from all the participants, which also included consent for utilisation of this data for secondary analysis.

Results

The overall prevalence of smoked tobacco dependence among participants who use smoked tobacco products was 59.4%. There was no significant association between any of the socio-demographic, economic, dietary factors and smoked tobacco dependence among participants attending LSTCSP [Table 1].

Mean scores of neuroticism among participants who had dependence were significantly different compared to participants without dependence to smoked tobacco products [Table 2]. There was no significant difference in mean scores of any other life skills domains, quality of life, and personality traits among those who had dependence on smoked tobacco compared to those who did not. There was no significant association between any of the work-related factors and smoked tobacco dependence among participants attending LSTCSP (Table not shown). Among the health-related factors, sexual practices, and behavioural factors, screened positive for symptoms of generalised anxiety and ever use of no-smoke tobacco products were significantly associated with smoked tobacco dependence [Table 3]. Among the social factors, use of smokeless tobacco, and alcohol among peers, decision-making in the family was significantly associated with smoked tobacco dependence [Table 4].

Table 1: Sociodemographic, economic, dietary characteristics and smoked tobacco dependence among participants attending LSTCSP (2017–2022)

	Smoked Tobacco Dependence			
	Yes *n* (%)	No *n* (%)	Total *n* (%)	*P**
Age (in completed years)				
18–29	15 (46.3)	13 (53.57)	28 (8.7)	0.826
30–39	43 (37.7)	71 (62.3)	114 (35.6)	
40–49	48 (41.0)	69 (59.0)	117 (36.6)	
Above 50	26 (42.6)	35 (57.4)	61 (19.1)	
Gender				0.619
Female	6 (60.0)	4 (40.0)	10 (3.1)	
Male	184 (59.4)	126 (40.6)	310 (96.9)	
Religion				0.252
Hindu	177 (60.0)	118 (40.0)	295 (92.2)	
Muslim	7 (70.0)	3 (30.0)	10 (3.1)	
Others	6 (40.0)	9 (60.0)	15 (4.7)	
Locality				0.650
Rural	69 (61.1)	44 (38.9)	113 (35.3)	
Urban	121 (58.5)	86 (41.5)	207 (64.7)	
Educational status				0.822
Graduation and below	22 (61.1)	14 (38.9)	36 (11.3)	
Post-graduation and above	168 (59.2)	116 (40.8)	284 (88.7)	
Marital status				0.083
Married	167 (60.7)	108 (39.3)	275 (85.9)	
Unmarried	23 (54.8)	19 (45.2)	42 (13.1)	
Others	0 (0.0)	3 (100.0)	3 (0.9)	
Total monthly household income^{+} (in rupees) (*n*=303)	75400 (44000)	77428 (45000)	76000 (45000)	0.964
Landholding				
Own a house	115 (57.5)	85 (42.5)	200 (62.5)	0.378
Own agricultural land	100 (62.1)	61 (37.9)	161 (50.3)	0.316
Predominant diet consumed (*n*=318)				0.381
Vegetarian	71 (57.3)	53 (42.7)	124 (39.0)	
Nonvegetarian	10 (76.9)	3 (23.1)	13 (4.1)	
Mixed	109 (60.2)	72 (39.8)	181 (56.9)	
Total	190 (59.4)	130 (40.6)	320 (100.0)	

n=320 unless otherwise specified. **P*-value for Chi-square test/Fisher's exact test for categorical variables and Mann–Whitney *U*-test for continuous variables; $^{+}$numbers indicate median and figures in parenthesis indicates interquartile range

Ever use of smokeless tobacco products and screened positive for symptoms of generalised anxiety increased the odds of smoked tobacco dependence by ~2 times as compared to their counterparts ($AOR_{smokeless}$ = 2.05, 95% CI 1.11–3.78; $AOR_{screened\ positive\ for\ anxiety}$ = 2.53, 95% CI 1.32–4.84). Collective decision making in the family reduced the odds of smoked tobacco dependence by 65% (AOR = 0.35, 95% CI 0.18–0.66) as compared to decision-making by one-self. Every unit increase in neuroticism personality trait score (AOR = 0.64, 95% CI 0.44–0.93) was associated with a 36% reduction in odds of smoked tobacco dependence [Table 5].

Discussion

The overall estimate of the prevalence of smoked tobacco dependence among participants and those who had ever used smoked tobacco was 6.1% (190/3104 data not shown) and 59.4%, respectively. Ever use of smokeless tobacco products, screening positive for symptoms of generalised anxiety was significantly associated with increased odds of smoked tobacco dependence, while making decisions collectively in the family and neuroticism were significantly associated with reduced odds of smoked tobacco dependence.

The overall prevalence of smokeless tobacco observed in this study is lower as compared to the report of NMHS 20.9% and few other studies conducted in India.[4,13,14] The prevalence among smokers is higher compared to these studies. The difference in prevalence estimate might be due to the difference in study population and methodology used. It was observed that ever use of smokeless tobacco products significantly increased the odds of smoked tobacco dependence compared to those who never used. There is evidence that smokeless tobacco serves as a gateway for the initiation of smoking; also, the nicotine from smokeless tobacco increases the tendency to smoke.[15] It is also observed in few other studies that both smokeless tobacco use and smoked tobacco use are associated with each other.[15,16] However, all these studies have seen the association between smokeless tobacco and smoking but not smoked tobacco dependence. However, this may hold true as initiation is likely to lead to

Table 2: Quality of life, life skills, personality traits and smoked tobacco dependence among participants attending LSTCSP (2017–2022)

	Smoked Tobacco Dependence			
	Mean score (SD)			*P**
	Yes	No	Total	
Quality of life				
Physical quality of life (*n*=317)	77.56 (12.7)	78.74 (11.3)	78.04 (12.2)	0.398
Psychological quality of life (*n*=316)	70.43 (11.2)	70.03 (10.0)	70.27 (10.7)	0.742
Social quality of life (*n*=311)	77.58 (15.8)	77.56 (15.5)	77.57 (15.6)	0.990
Environmental quality of life (*n*=318)	68.73 (13.0)	70.66 (13.5)	69.52 (13.2)	0.201
Life skills				
Decision making (*n*=318)	36.59 (3.9)	36.15 (4.3)	36.41 (4.0)	0.341
Problem solving (*n*=318)	53.11 (6.4)	53.48 (6.1)	53.26 (6.3)	0.610
Empathy (*n*=315)	47.06 (5.6)	47.62 (5.6)	47.29 (5.6)	0.395
Self-awareness (*n*=314)	40.52 (5.3)	41.04 (4.9)	40.73 (5.2)	0.378
Communication skills (*n*=318)	37.72 (4.6)	38.05 (4.4)	37.86 (4.5)	0.519
Interpersonal relationship (*n*=315)	71.82 (7.8)	72.53 (7.8)	72.11 (7.8)	0.431
Coping with emotions (*n*=319)	35.47 (4.3)	35.49 (4.2)	35.48 (4.3)	0.956
Coping with stress (*n*=319)	34.24 (4.7)	34.74 (4.4)	34.45 (4.6)	0.345
Creative thinking (*n*=318)	54.20 (7.4)	54.95 (7.2)	54.50 (7.3)	0.366
Critical thinking (*n*=317)	39.17 (5.3)	39.16 (5.4)	39.16 (5.3)	0.995
Overall life skills level[+] (*n*=305)				0.197
Low life skills	20 (74.1)	7 (25.9)	27 (8.8)	
Moderate life skills	45 (54.9)	37 (45.1)	82 (26.9)	
High life skills	112 (57.1)	84 (42.9)	196 (64.3)	
Personality traits				
Extraversion (*n*=268)	3.44 (0.8)	3.62 (0.8)	3.51 (0.8)	0.082
Agreeableness (*n*=271)	3.87 (0.7)	3.77 (0.6)	3.83 (0.6)	0.236
Conscientiousness (*n*=269)	3.99 (0.7)	3.87 (0.7)	3.95 (0.7)	0.167
Neuroticism (*n*=271)	2.07 (0.7)	2.25 (0.7)	2.14 (0.7)	0.048
Openness (*n*=270)	3.11 (0.4)	3.06 (0.3)	3.09 (0.4)	0.275

SD=Standard deviation. **P*-value for Chi-square test for independence for categorical variables and independent *t*-test for continuous variables; [+]Whole numbers indicate frequency and figures in parenthesis indicate percentage

dependence among users overtime. To our knowledge, there are hardly any studies exploring the association between smokeless tobacco use and dependence on smoked tobacco directly. The association between anxiety and smoked tobacco dependence is bidirectional. The interrelationship between anxiety and smoking disorders is broadly explained from a bio-psychosocial perspective that involves the interaction of genetic, biochemical, psychological, interpersonal, and vulnerability factors.[17] This interaction is also explained by the coping-stress model,[18] where dependence on smoking develops when one person initiates smoking as a mechanism of coping with life's stressors.[19] In congruity with other studies, screening positive for symptoms of generalised anxiety significantly increased the odds of smoked tobacco dependence in our study.[17,20] On the contrary, it is also known that dependence on nicotine can also induce anxiety disorders.[21-23] Lack of temporality limits the ascertainment of the direction of association between anxiety and smoked tobacco dependence in our study. Neurotic personality trait was found to be protective against dependence on smoked tobacco products, contrary to other studies which have assessed the association between neuroticism to nicotine dependence and smoking.[24-26] This needs to be further explored. Understanding that smokeless tobacco and screening positive for anxiety are risk factors for smoking dependence has important implications in primary care practise. Primary care providers and family physicians are best positioned to assess these among smokers and educate them on their risk of smoked dependence and the complications associated with the same. Further, referral services could be provided for those in need.

With an overall sample size of 320 eligible subjects, the results yield a power of ~91.5%, which is a strength of our study. This study contributes to a new dimension of risk factors of smoked tobacco dependence among teaching faculties from various educational institutions across different districts in Karnataka. This adds to the already existing literature with our study focusing on a specific subset of the population in a state. Further, the finding of collective decision-making in the family being associated with reduced odds of smoked tobacco dependence adds to the literature as, to our knowledge, there is no study that has assessed this association. We also assessed a range of hypothesised risk factors with smoked tobacco dependence utilising a conceptual framework developed based on literature review and expert opinion specifically for the study.

Our study has few limitations that need mention. Cross-sectional nature of the study limits the establishment of temporality of the association of certain identified risk factors. The data required for

Table 3: Health-related, sexual practices, behavioural factors and smoked tobacco dependence among participants attending LSTCSP (2017–2022)

	Smoked Tobacco Dependence			
	Yes *n* (%)	No *n* (%)	Total *n* (%)	*P**
Health-related factors				
Physical activity done daily to promote healthy living (*n*=317)	154 (60.2)	102 (39.8)	256 (80.8)	0.691
Have a diagnosed health problem (*n*=320)	94 (60.3)	62 (39.7)	156 (48.7)	0.754
Have family members diagnosed with health problems (*n*=320)	89 (61.4)	56 (38.6)	145 (45.3)	0.506
Ever experienced injuries in past 12 months (*n*=316)	12 (54.5)	10 (45.5)	22 (7)	0.624
Ever experienced violence in past 6 months (*n*=316)	29 (58.0)	21 (42.0)	50 (15.8)	0.893
Screened positive for depressive symptoms (*n*=316)	22 (71.0)	9 (29.0)	31 (9.8)	0.149
Screened positive for symptoms of generalised anxiety (*n*=315)	60 (72.3)	23 (27.7)	83 (26.4)	0.005
Ever attempted self-harm in past 12 months (*n*=316)	13 (72.2)	5 (27.8)	18 (5.7)	0.264
Sexual practices				
Ever had sex (*n*=316)	153 (58.6)	108 (41.4)	261 (82.6)	0.661
Ever had sex with multiple partners (*n*=260)	34 (61.8)	21 (38.2)	55 (21.2)	0.614
Behavioural factors				
Does self-talk (*n*=320)	108 (57.1)	81 (42.9)	189 (59.1)	0.329
Ever experienced crisis in life (*n*=318)	130 (60.7)	84 (39.3)	214 (67.3)	0.494
Ever used nonsmoke tobacco products (*n*=317)	63 (71.6)	25 (28.4)	88 (27.8)	0.005
Ever consumed alcohol (*n*=318)	164 (60.7)	106 (39.3)	270 (84.9)	0.163
Ever used substances other than alcohol or tobacco (*n*=316)	10 (66.7)	5 (33.3)	15 (4.7)	0.529
At risk of cell phone addiction (*n*=313)	46 (56.1)	36 (43.9)	82 (26.2)	0.519

**P*-value for Chi-square test for independence/Fisher's exact test*

Table 4: Social factors associated with smoked tobacco dependence among participants attending LSTCSP (2017–2022)

	Smoked Tobacco Dependence			
	Yes *n* (%)	No *n* (%)	Total *n* (%)	*P**
Peer characteristics				
Number of peers[+] (*n*=303)	35 (85)	29 (85)	30 (85)	0.089
Habits				
Smoked tobacco products (*n*=313)	91 (64.5)	50 (35.5)	141 (45.1)	0.095
Use smokeless tobacco products (*n*=311)	41 (71.9)	16 (28.1)	57 (18.3)	0.034
Drink alcohol (*n*=313)	118 (64.5)	65 (35.5)	183 (58.5)	0.031
Use substances other than alcohol or tobacco (*n*=313)	14 (82.4)	3 (17.6)	17 (5.5)	0.073
Family characteristics				
Number of members in the household[+] (*n*=315)	4 (2)	3 (1)	3 (1)	0.035
Spend time with family (*n*=320)	180 (58.8)	126 (41.2)	306 (95.6)	0.415
Decision making in the family (*n*=320)				0.001
Self	66 (76.7)	20 (23.3)	86 (26.9)	
Somebody else make decision	5 (50.0)	50 (50.0)	10 (3.1)	
Collectively make decision	119 (53.1)	105 (46.9)	224 (70.0)	
Concerned about family members (*n*=320)	166 (59.7)	112 (40.3)	278 (86.9)	0.752
Level of communication with family members (*n*=317)				0.669
More than adequate	41 (60.3)	27 (39.7)	68 (21.5)	
Adequate	135 (59.5)	92 (40.5)	227 (71.6)	
Inadequate	11 (50.0)	11 (50.0)	22 (6.9)	
Arguments within family (*n*=319)	148 (60.9)	95 (39.1)	243 (76.2)	0.281
Family support (*n*=320)				0.050
Completely supportive	120 (61.5)	75 (38.5)	195 (60.9)	
Usually supportive	52 (59.1)	36 (40.9)	88 (27.5)	
Sometime supportive	18 (56.3)	14 (43.7)	32 (10.0)	
Not supportive	0 (0.0)	5 (100.0)	5 (1.6)	

**P*-value for Chi-square test/Fisher's exact test for categorical variables and Mann–Whitney *U*-test for continuous variables; [+]numbers indicate median and figures in parenthesis indicates interquartile range*

the study were collected using a self-reported questionnaire which may have some drawbacks of missing data, regularity in their response, etc.[27] This limitation, to an extent, was addressed by the presence of a trained project member who supervised the entire process of data collection and provided clarifications and support as required. Even though the participants of LSTCSP are deputed

Table 5: Multivariable analysis of smoked tobacco dependence among participants attending LSTCSP (2017–2022)

	Smoked Tobacco Dependence (*n*=264)					
	OR	95% CI*	*P*[+]	AOR[‡]	95% CI*	*P*[§]
Decision-making in the family						
Self	Reference	Reference	Reference	Reference	Reference	Reference
Somebody else make decision	0.30	0.08–1.15	0.080	0.25	0.06–1.04	0.057
Collectively make decision	0.34	0.20–0.60	<0.001	0.35	0.18–0.66	0.001
Neuroticism	0.71	0.51–1.00	0.05	0.64	0.44–0.93	0.021
Ever used smokeless tobacco products	2.13	1.25–3.63	0.005	2.05	1.11–3.78	0.021
Screened positive for symptoms of generalised anxiety	2.16	1.25–3.72	0.006	2.53	1.32–4.84	0.005

Goodness of fit (area under the curve) = 0.69; Hosmer–Lemeshow χ^2=3.76, *P*=0.807. OR=Crude unadjusted odds ratio. *95% confidence interval (CI); [+]*P*-value of univariate logistic regression significant at *P*<0.10; [‡]Adjusted odds ratio; [§]*P*-value of multivariable logistic regression significant at *P*<0.05

from various educational institutions especially from government setup, the study findings can be generalised to similar subpopulations across Karnataka due to the considerable regional representation of participants across the state. Certain questions in the questionnaire may be considered sensitive and contribute to social desirability bias. However, we believe that this information bias is minimal as data collected was through self-reported questionnaire after obtaining informed consent and ensuring confidentiality.

This study highlights the prevalence and risk factors of smoked tobacco dependence among teaching faculty from various institutions across Karnataka. Understanding various factors associated with smoked tobacco dependence is important for developing cessation programmes as well as in preventing its onset. Our study observed that ever use of smokeless tobacco products and screening positive for symptoms of generalised anxiety has to be stressed upon while planning interventions as it significantly increased the odds of smoked tobacco dependence. Primary care providers and family physicians are a key link in the levels of health care. Individual level interventions in terms of health promotion and primary prevention can best be implemented through them. The results of this study have implications on health promotion and prevention programmes as well as cessation programmes related to smoked tobacco dependence.

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Conflicts of interest

There are no conflicts of interest.

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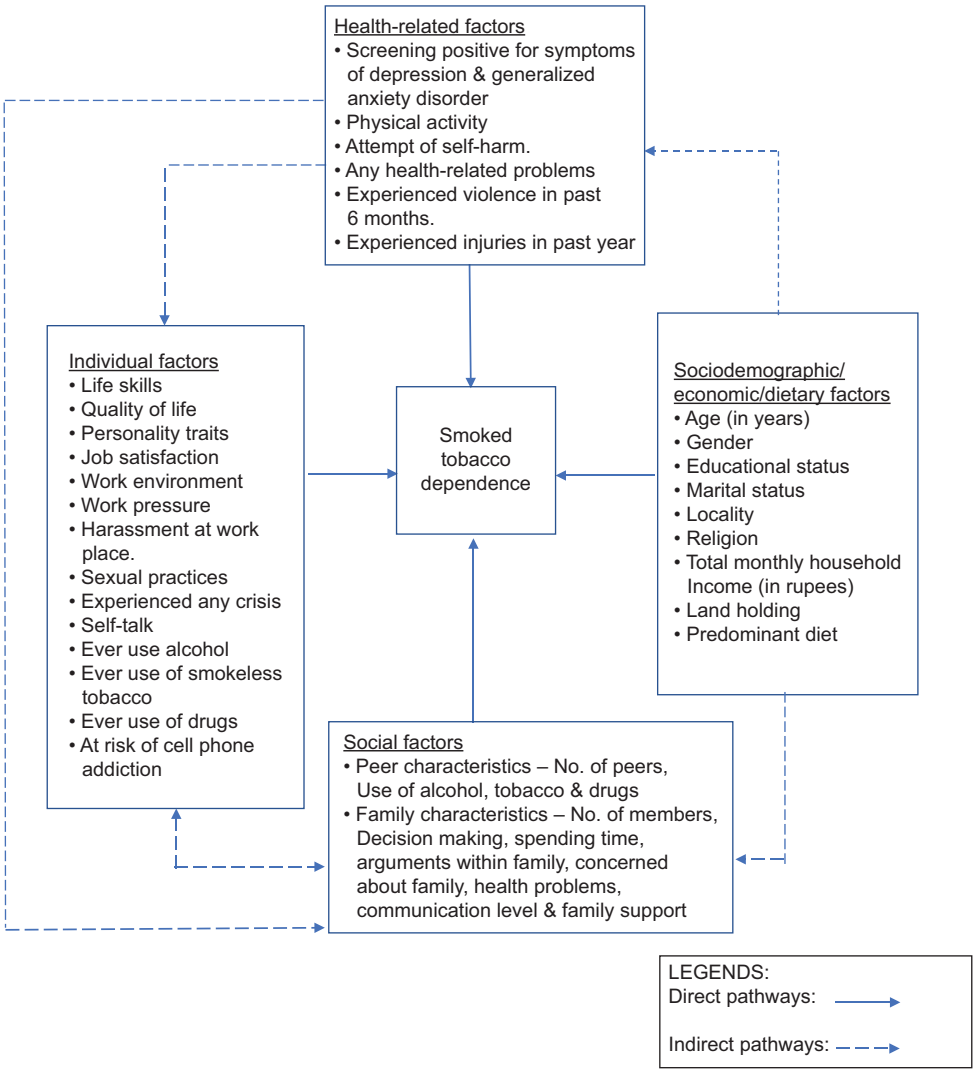

Supplementary Figure 1: Conceptual framework