RESEARCH ARTICLE

Tobacco Use, Beliefs and Risk Awareness in University Students from 24 Low, Middle and Emerging Economy Countries

Karl Peltzer[1,2,3]*, Supa Pengpid[1,2]

Abstract

   The aim of this study was to determine the prevalence of tobacco use, beliefs and risk awareness and psychosocial correlates of tobacco use among university students in 24 low, middle and emerging economy countries. Using anonymous questionnaires, data were collected from 16953 undergraduate university students (mean age 20.9, SD=2.9) from 25 universities in 24 countries across Asia, Africa and the Americas. Results indicate that overall 13.3% of the university students were current tobacco users, 22.4% for men and 6.6% for women, ranging from 3.8% in Singapore to 32.5% in Cameroon. The risk awareness of the smoking lung cancer link was 83.6%, while the risk awareness of the smoking heart disease link was 46.5%. Multivariate logistic regression found that older age, male gender, having a wealthy family background, living in a low income country, residing off campus on their own, poor beliefs in the importance not to smoke, awareness of the smoking heart disease link, hit by a sexual partner, depressive symptoms, and substance use (binge drinking and illicit drug use) were associated with current tobacco use.

Keywords: Tobacco use - health beliefs - risk awareness - mental health - child abuse - university students - multi-country

Introduction

   Tobacco use is globally the leading cause of avoidable premature mortality (Samet, 2013). Although tobacco use seemed to have declined in a number of high-income countries, there may be an increase and greater risk in low- and middle-income countries due to the aggressive tactics of the tobacco industry (Samet, 2013). Epidemiologic studies have shown that "most tobacco users begin as adolescents or young adults and individuals who reach their mid-20s as nonsmokers are unlikely to ever become tobacco users" (Aldrich et al., 2014).

   In a previous study among university students, predominantly from high income countries, Steptoe et al. (2002) found that overall 34% of men and 27% of women were current smokers, including 4 middle income countries in Columbia 37% in men and 28% in women, in South Africa, 15% and 4%, Thailand 14% and 2%, and Venezuela 22% in men and 22% in women. In other university student populations in low and middle income countries, current tobacco use or smoking was 9% in Egypt (El Ansari et al., 2012), 33% in India (Mehrotra et al., 2010), 19.8% of male and 2.2% of female students in Iran (Moosazadeh et al., 2013), 14.7% in Malaysia (Saravanan and Heidhy, 2014), 5.7% (males 7.7%, females 2.0%) in Nigeria (Fawibe and Shittu, 2011), among male 24% in Pakistan (Rozi et al., 2007), 45.9% in Turkey (Mergen

et al., 2011).

   Poor risk awareness and beliefs about the negative effects of tobacco use may influence the level of consumption of tobacco in different population groups, including young adults (Steptoe et al., 2002; Merdad et al., 2007; Gupta and Kumar, 2014). Several studies among youth found relatively high awareness that smoking tobacco causes serious illness (>90% in 12 of 14 countries) (Gupta and Kumar, 2014). Among South African university students, awareness of the link between smoking and lung cancer was high (93%), but awareness of the role of smoking in heart disease was low (16%) (Peltzer, 2001). In Nigeria 67.6% of a sample of university students believed that smoking could never have a negative impact on their health status (Fawibe and Shittu, 2011), and among youth in India about 80% of students considered using tobacco to be harmful to their health. (Gajalakshmi et al., 2004).

   Factors associated with current tobacco use have been identified, in part, as follows: *i*) sociodemographic factors such as being male (Sen and Basu, 2000; Peltzer, 2001; Sinha and Gupta, 2007), older age (Peltzer, 2001) and lower socioeconomic status (Rozi et al., 2007; Mergen et al., 2011; Thakur et al., 2013); *ii*) beliefs and risk awareness, the importance to health of not smoking was associated with smoking status (non-smoking versus smoking) (Peltzer, 2001; Steptoe et al., 2002); *iii*) Poor

[1]*ASEAN Institute for Health Development, Mahidol University, Salaya, Phutthamonthon, Nakhonpathom, Thailand,* [2]*University of Limpopo, Turfloop Campus, Sovenga,* [3]*HIV/AIDS/STIs/and TB (HAST), Human Sciences Research Council, Private Bag X41, Pretoria, South Africa *For correspondence: karl.pel@mahidol.ac.th*

mental health (depression, anxiety) (Halperin et al., 2010; Saravanan and Heidhy, 2014) and substance use, including risky drinking (Halperin et al., 2010; Mergen et al. 2011) and illicit drug use (El Ansari et al., 2012); *iv*) violence experience, including intimate partner violence (Caleyachetty et al., 2014) and reported abuse (Halperin et al., 2010), and *v*) obesity (El Ansari et al., 2012). The aim of this study was to determine the prevalence of tobacco use, beliefs and risk awareness and psychosocial correlates of tobacco use among university students in 24 low, middle and emerging economy countries.

Materials and Methods

Sample and procedure

This cross-sectional study was carried out with a network of collaborators in participating countries (see Acknowledgments). The anonymous, self-administered questionnaire used for data collection was developed in English, then translated and back-translated into languages (Arabic, Bahasa, Chinese, French, Lao, Russian, Spanish, Thai, Turkish) of the participating countries. The study was initiated through personal academic contacts of the principal investigators. These collaborators arranged for data to be collected from intended 400 male and 400 female undergraduate university students aged 16-30

years by trained research assistants in 2013 in 1 or 2 universities in their respective countries. The universities involved were located in the capital cities or other major cities in the participating countries. Research assistants working in the participating universities asked classes of undergraduate students to complete the questionnaire at the end of a teaching class. Classes were recruited according to timetable scheduling using stratified random sampling. Written informed consent was obtained from participating students, and the study was conducted in 2013. Participation rates were in most countries over 90%. Ethics approvals were obtained from all participating institutions.

Measures

Tobacco use was assessed with the questions: *i*) Do you currently use one or more of the following tobacco products (cigarettes, snuff, chewing tobacco, cigars, etc.)? Response options were "yes" or "no". *ii*) In the past month, how often have you used one or more of the following tobacco products (cigarettes, snuff, chewing tobacco, cigars, etc.)? Response options were once or twice, weekly, almost daily and daily (WHO, 1998). Attitudes or beliefs were assessed by asking participants to rate the importance of not smoking for health on a 10-point scale, ranging from 1=low importance to 10=very high

Table 1. Tobacco Use Prevalence, Awareness and Attitudes by Country

	N	Current (past month) any tobacco use All %	Male %	Female %	Statistic P-value	Daily or almost daily tobacco use [of tobacco users] %	Beliefs about the importance not to smoke Range 1-10 M (SD)	Awareness smoking lung cancer link %	Awareness smoking heart disease link %	National current tobacco use in 13-15 or 16 year-olds (or adults*)[5] All (Male/Female) %
All	16953	13.3	22.4	6.6	<0.001	69.2	8.1 (3.2)	83.6	46.5	
Caribbean and South America										
Barbados[4]	482	6.2	8.1	3.6	0.054	52.5	8.4 (2.7)	96.4	34.2	14.1 (18.4/9.7)
Grenada[3]	434	7.1	13.5	4.1	<0.001	33.3	8.7 (2.6)	94.4	45.3	20.5 (24.5/16.7)
Colombia[3]	816	14.7	25.0	6.6	<0.001	90.3	7.7 (3.6)	96.6	37.6	18.0 (31.0/5.0)*
Venezuela[3]	495	16.6	26.8	9.1	<0.001	92.3	8.4 (2.9)	93.1	37.1	9.4 (11.0/7.2)
Sub-Saharan Africa										
Cameroon[2]	627	32.5	48.5	20.6	<0.001	71.2	8.1 (3.2)	92.2	19.2	10.9 (14.0/8.2)
Ivory Coast[2]	646	5.3	7.8	2.6	0.003	52.9	8.3 (3.4)	85.3	46.8	10.1 (26.3/10.9)
Madagascar[1]	714	9.7	14.1	4.9	<0.001	41.5	8.3 (3.2)	83.5	19.1	22.8 (33.2/14.3)
Mauritius[3]	461	11.7	25.5	4.9	<0.001	51.5	8.5 (2.7)	94.5	60.3	17.2 (24.5/10.0)
Namibia[3]	390	8.7	18.1	5.6	<0.001	47.4	8.1 (3.4)	87.2	29.9	31.1 (31.9/29.9)
Nigeria[2]	452	4.0	4.9	2.9	0.262	10.0	5.6 (4.1)	73.4	47.5	15.4 (19.2/11.1)
North Africa, Near East and Central Asia										
Egypt[2]	803	7.7	15.5	0.9	<0.001	70.8	8.7 (2.8)	85.5	82.5	5.1 (7.2/2.8)
Tunisia[3]	868	23.0	53.3	7.9	<0.001	62.5	5.7 (3.3)	16.6	8.8	11.4 (20.1/3.8)
Turkey[3]	800	26.5	36.3	16.8	<0.001	71.6	7.5 (3.6)	86.8	71.1	11.9 (14.4/7.4)
Kyrgyzstan[1]	837	29.3	49.7	14.0	<0.001	63.5	8.0 (3.3)	91.3	68.2	7.2 (10.3/4.4)
Russia[3]	787	29.6	36.4	23.1	<0.001	69.2	7.8 (3.1)	88.4	39.8	40.0 (59.0/25.0)*
South Asia and China										
Bangladesh[1]	739	25.7	42.1	4.4	<0.001	55.4	7.3 (3.5)	77.1	68.4	6.9 (9.1/5.1)
India[2]	800	6.9	7.8	5.0	0.179	14.9	8.1 (3.3)	82.8	34.1	14.6 (19.0/8.3)
Pakistan	811	12.5	21.2	6.2	<0.001	33.3	9.6 (0.9)	43.4	29.9	9.8 (15.0/1.9)
China[3]	984	3.8	7.2	2.6	<0.001	45.2	9.1 (1.7)	97.5	54.5	25.0 (47.0/2.0)*
Southeast Asia										
Indonesia[2]	750	5.9	17.7	0.6	<0.001	42.3	9.3 (2.1)	82.1	73.3	22.5 (41.0/6.2)
Laos[2]	806	7.7	10.6	6.2	0.025	30.6	7.3 (3.9)	94.0	21.0	12.7 (18.7/6.0)
Philippines[2]	774	6.5	13.6	4.0	<0.001	28.0	9.5 (1.5)	99.5	48.4	13.7 (18.8/9.3)
Singapore[4]	892	3.5	5.8	1.1	<0.001	33.3	8.9 (2.1)	95.1	62.5	6.0 (8.0/5.0)
Thailand[3]	785	6.5	16.0	2.8	<0.001	81.0	8.7 (2.5)	93.7	29.4	17.9 (26.9/9.)

[1]Low income country; [2]Lower middle income country; [3]Upper middle income country; [4]High income country (Source: World Bank, 2013). [5]Source: WHO, 2014b

importance (Steptoe et al., 2002). Risk awareness was assessed in a yes-no format, referring to links between smoking and lung cancer, and between smoking and heart disease (Steptoe et al., 2002).

Socio-demographic questions included age, gender, residence and socioeconomic background were assessed by rating their family background as wealthy (within the highest 25% in "country", in terms of wealth), quite well off (within the 50% to 75% range for their country), not very well off (within the 25% to 50% range from "country"), or quite poor (within the lowest 25% in their country, in terms of wealth) (Wardle and Steptoe, 1991).

Child abuse was assessed with two questions, regarding physically abused as a child and sexually abused as a child. Intimate partner violence was assessed with the question, "Ever been hit by a sex partner?" (Sikkema et al., 2011).

Mental health and addictive risk behaviour

Centres for Epidemiologic Studies Depression Scale (CES-D). We assessed depressive symptoms using the 10-item version of the CES-D (Andresen et al., 1994). Scoring is classified from 0-9 as having a mild level of depressive symptoms, 10 to 14 as moderate depressive symptoms, and 15 representing severe depressive symptoms (Kilbourne

et al., 2002). The Cronbach alpha reliability coefficient of this 10-item scale was 0.74 in this study.

Post traumatic stress disorder (PTSD). Breslau's 7-item screener was used to identify PTSD symptoms in the past month (Kimerling et al., 2006). Items asked whether the respondent had experienced difficulties related to a traumatic experience (e.g., "Did you become jumpy or get easily startled by ordinary noises or movements?"). Participants who answered affirmatively to at least four of the questions were considered to have a positive screen for PTSD (Kimerling et al., 2006). The Cronbach alpha reliability coefficient of this 7-item scale was 0.75 in this study.

Binge drinking was assessed with one item, "How often do you have (for men) five or more and (for women) four or more drinks on one occasion?" Response options ranged from 1=never to 5=daily or almost daily (Babor et al., 2001).

Drug use was assessed with the question, "How often have you taken drugs in the past 12 months; other than prescribed by the health care provider?" Response options included 1=0 times to 4=10 or more times.

Anthropometric measurements. Height (without footwear) using a stadiometer and weight (without footwear and any heavy accessories) using a calibrated

Table 2. Associations between Current Tobacco Use, Child Abuse and Mental Health Variables in University Students by Gender from 24 low and Middle Income and Emerging Economy Countries, 2013

Variables	%	Current (past month) any tobacco use	
		Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Socio-demographics			
Age in years			
16 -19	8.9	1	1
20 - 21	14.4	1.73 (1.54-1.95)***	1.59 (1.35-1.88)***
22 or more	16.6	2.05 (1.82-2.31)***	1.51 (1.27-1.79)***
Gender			
Female	6.6	1	1
Male	22.4	4.09 (3.71-4.50)***	2.81 (2.45-3.22)***
Wealth			
Not well off/Poor	9.9	1	1
Wealthy/ Quite well off	15.9	1.72 (1.57-1.89)***	1.97 (1.71-2.26)***
Country income			
Low income	22	1	1
Middle income	11.9	0.48 (0.43-0.54)***	0.59 (0.49-0.72)***
High income	4.4	0.17 (0.13-0.22)***	0.14 (0.10-0.20)***
Residence			
On campus	8.8	1	1
Off campus on own	17.9	2.24 (1.95-2.57)***	1.24 (1.02-1.51)*
With parents/guardians	12.9	1.52 (1.34-1.73)***	0.94 (0.78-1.13)
Beliefs and knowledge			
Beliefs about the importance not to smoke			
Low (1-5)	32.1	1	1
Medium (6-9)	19.2	0.50 (0.44-0.57)***	0.62 (0.52-0.73)***
High (10)	6.2	0.14 (0.13-0.16)***	0.14 (0.12-0.16)***
Awareness of smoking lung cancer link (base=not aware)	12.6	0.71 (0.63-0.80)***	0.98 (0.82-1.16)
Awareness of smoking heart disease link (base=not aware)	14.3	1.19 (1.09-1.30)***	1.31 (1.14-1.49)***
Violence experience			
Hit by sexual partner (base=no)	34.3	3.93 (3.34-4.62)***	2.23 (1.71-2.90)***
Physically abused as a child (base=no)	18.4	1.58 (1.30-1.92)***	1.14 (0.83-1.56)
Sexually abused as a child (base=no)	16	1.31 (0.97-1.76)	---
Mental health and addictive risk behaviour			
Depression symptoms (severe)	16.9	1.40 (1.24-1.58)***	1.27 (1.05-1.54)*
PTSD symptoms (≥4 or more)	16.9	1.42 (1.27-1.58)***	1.14 (0.97-1.35)
Binge drinking (past month)	32.7	4.08 (3.60-4.54)***	3.32 (2.84-3.88)***
Drug use in past 12 months	19.4	1.55 (1.41-1.71)***	1.55 (1.34-1.80)***
Obesity (base=not obese)	17.8	1.53 (1.26-1.87)***	1.22 (0.91-1.64)

***p<.001; **p<.01; *p<.05; CI=Confidence Interval

weighing scale were
measured. Body mass index (BMI) was calculated as weight in kilogrammes divided by height in metre squared. There was a low response rate of anthropometric measurements for Grenada and Cameroon and for the China Hongkong sub-sample and in Bangladesh and Indonesia body weight and height was collected by self-report. BMI was used as an indicator of obesity (≥27.5 kg/m2) in the East and South Asian participants (WHO Expert Consultation, 2004), and for the other countries, obesity was defined as BMI=30 kg/m2 (WHO, 2014a).

Data analysis

The data were analysed using IBM SPSS (version 20.0). The proportion of tobacco use behaviour, sociodemographic factors, child abuse and mental health and substance use variables was calculated as a percentage. The Pearson Chi - square was used to calculate gender differences. Logistic regression analysis was done with STATA to calculate the crude odds ratio (OR) with 95% confidence interval (CI) to determine the associations between the potential determinants and current tobacco use. All variables which were statistically significant (p<0.05) in bivariate analyses were included in the multivariate model. The country was entered as the primary sampling unit for survey analysis in STATA in order to achieve accurate CIs, given the clustered nature of the data.

Results

Descriptive results

The sample included 16953 university students (41.0% men and 59.0% women), with a mean age of 20.9 years (SD=2.9). The percentage of university students reporting to be current (past month) tobacco users was 13.3% for all countries, 22.4% for men and 6.6% for women, ranging from 3.8% in Singapore to 32.5% in Cameroon. In 22 of 24 countries male students were more frequently current tobacco users than female students, except for India and Nigeria. Overall, of current tobacco users, 69.2% used tobacco products daily or almost daily. Generally, university students gave a high rating (8.1, range 1-10) on the importance not to smoke, with ratings above 9.0 in China, Indonesia, Pakistan and Philippines, and ratings below 6.0 in Nigeria and Tunisia. The risk awareness of the smoking lung cancer link was 83.6%, while the risk awareness of the smoking heart disease link was 46.5%. The risk awareness of the smoking disease link was lowest in university students from Pakistan and Tunisia (Table 1).

Associations with current tobacco use

Multivariate logistic regression found that older age, male gender, having a wealthy family background, living in a low income country, residing off campus on their own, poor beliefs in the importance not to smoke, awareness of the smoking heart disease link, hit by a sexual partner, depressive symptoms, and substance use (binge drinking and illicit drug use) were associated with current tobacco use (Table 2).

Discussion

In this large study of university students from 24 low, middle income and emerging economy countries it was found that the prevalence of current tobacco use was largely similar to previous studies among university students in Egypt (El Ansari et al., 2012), Nigeria (Ndom and Adelekan, 1996; Fawibe and Shittu, 2011), Pakistan (Rozi et al., 2007), Thailand (Steptoe et al., 2002), and other developing countries, including Iran (Haghdoost and Moosazadeh, 2013) and Malaysia (Saravanan and Heidhy, 2014). In the study countries of Columbia and Venezuela lower rates of current tobacco use were found as compared to a survey in 2001 (Steptoe et al., 2002). Overall, the prevalence of current tobacco use in this study sample seemed to be lower than in a previous survey among university students in predominantly high income countries (Steptoe et al., 2002). Compared with nationally representative surveys on the prevalence of current tobacco use, predominantly with school-going adolescents (aged 13-15 or 16), and in some countries adults surveys (15 years and above), in the study countries, this study found in 20 countries a lower and in 4 countries a high prevalence of current tobacco use (Table 1, WHO, 2014b). However, there were large country variations in the prevalence of current tobacco use in the study countries. High prevalence rates above 35% among men were found in Bangladesh, Cameroon, Kyrgyzstan, Russia, Tunisia, Turkey, and above 15% among women students in Cameroon, Turkey, and Russia. Similar high prevalence rates were also found among university students in previous studies in Bangladesh (Kamal et al., 2011), Kyrgyzstan (Agaku et al., 2013), Tunisia (Khefacha Aissa et al., 2014), Turkey (Onal et al., 2002) and in national adult data in Russia (WHO, 2014b). Compared to a previous study among university students in Cameroon (Mbatchou Ngahane et al., 2013), this study found a much higher prevalence of current tobacco use, and this study found a lower prevalence of tobacco use in China than in a previous study (Zhu et al., 2004). Among the different study regions, Near East and Central Asian countries had the highest and the Southeast Asian region countries the lowest prevalence of tobacco use, which confirms findings from the Global Youth Tobacco Surve in these regions (Warren et al., 2006). Increased efforts should be made in tobacco control, especially targeting these identified high prevalence countries.

The proportion of male university students who were current tobacco users was three times higher than those of female students. This large gender difference is in agreement with previous studies (Sen and Basu, 2000; Peltzer, 2001; Sinha and Gupta, 2007) in developing countries, while there are narrower gender differences in high income countries (Steptoe et al., 2002). University students living in low income countries and those with a wealthier family background were more likely current tobacco users that student from middle and high income countries and with a poorer family background. Previous studies found, however, that lower socioeconomic status (Rozi et al., 2007; Mergen et al., 2011; Thakur et al., 2013) was associated with current tobacco use, and pooled

cross-sectional data from the Global Youth Tobacco Surveys (Li and Guindon, 2013) found that there is a positive association between gross domestic product and the odds of an adolescent person in a low- and middle-income country being a current smoker. It is possible that in this study in particular in low income countries, university students form a minority affluent group being influenced and pressured by modern lifestyles which may be associated with increased tobacco use.

The study results further confirmed the strong association between tobacco use and beliefs in the importance of not smoking for health that was found in previous studies (Peltzer, 2001; Steptoe et al., 2002). This association with health beliefs can be utilized in tobacco use prevention or cessation programmes. The high awareness about the harmful effects of smoking tobacco in terms of lung cancer (>85% in most countries), while there was relatively low awareness of smoking tobacco with heart disease corresponds to findings from previous studies (Steptoe et al., 2002; Gupta and Kumar, 2014). The relationship between tobacco use and the risk awareness of specific health effects (lung cancer and heart disease) was less consistent. In bivariate analysis it was found that poor awareness of the smoking lung cancer link was associated with tobacco use. This could mean that although there was generally a high awareness of the smoking lung cancer link, more health education on this link could be warranted. Further, although the proportion of students who were aware of the smoking heart disease link was much lower than that for lung cancer, tobacco user tender to be more rather than less aware of the health effects than non-tobacco users. This result was also found among mainly university students from high income countries (Steptoe et al., 2002).

Regarding poor mental health, violence and addictive risk behaviours, this study found in agreement with previous studies (Halperin et al., 2010; Caleyachetty et al., 2014; Saravanan and Heidhy, 2014) that depressive symptoms, substance use (binge drinking, illicit drug use) and intimate partner violence (hit by sexual partner) were associated with current tobacco use. It appears that poor mental health, violence experiences and substance use may synergistically interact to increase tobacco use. Tobacco use intervention prevention programmes may need to include mental health, substance use and violence experiences.

Study limitations

This study had several limitations. The study was cross-sectional, so causal conclusions cannot be drawn. The investigation was carried out with students from one or two universities in each country, and inclusion of other centres could have resulted in different results. University students are not representative of young adults in general, and the tobacco use behaviour, beliefs, attitudes and its mental health correlates may be different in other sectors of the population. The data collection by self-report could have resulted of desired participants' responses. Further, some measures, such as sexual and physical child abuse were only assessed with one item, and future studies should assess the experience of child abuse with

standardised measures.

In conclusion, in this large study among university students from 24 low, middle income and emerging economy countries results suggest a significant proportion had used tobacco in the past months (daily or almost daily). Several risk factors including male gender, living in a low income country, health beliefs, intimate partner violence, poor mental health and substance use (binge drinking and illicit drug use) were identified which can be utilized in reaching these young people for change strategies in tobacco use prevention and control programmes.

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