ORIGINAL RESEARCH

Smoking prevalence among the adult population of Kosovo: Results of STEPS survey 2019

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Abstract

Aim: Tobacco use remains the leading preventable cause of death worldwide. The vast majority of these deaths occur in low – and middle-income countries, and the gap is expected to widen further in the coming decades. This study aimed to evaluate the prevalence of smoking among Kosovo adults by gender, age group and type of smoking.

Methods: A population-based survey was conducted among people aged 18-69 years from April 2018 to June 2019 using the WHO STEPs instrument. 2800 randomly selected households were approached using multistage cluster sampling, and 2695 agreed to participate in the survey (response rate 96.2%).

Results: According to the findings of our study, 25.7% of the population aged 18-69 years was a current smoker (men 35.3% vs. women 15.9%) and 90.1% of them smoked tobacco products on a daily basis (Men 91.5% current smokers on daily basis vs. Women 87.1% on daily basis). Smokers started smoking at an average age of 19.3 years. Women started smoking significantly later than men, at the age of 20.9 years, compared to 18.6 years for men, and the younger age group started smoking earlier. The average smoking duration is 19.3 years, with no gender differences (Men 19.5 years vs. Women 19.0 years average smoking duration). On average, 97.4% of daily smokers smoke manufactured cigarettes.

Conclusion: Smoking prevalence was high among Kosovo adults, especially men and the majority of them smoke on daily basis.

Keywords: *Kosovo, smoking prevalence, STEPs survey.*

Introduction

Tobacco use remains the leading preventable cause of death worldwide. Every year, it claims the lives of nearly 8 million people worldwide, of which more than 1.2 million deaths are due to second-hand smoke and 65 000 are children. Over 80% of the world's 1.3 billion tobacco users live in low-and middle-income countries. In 2020, 22.3% of the global population used tobacco, 36.7% of all men and 7.8% of the world's women [1]. In 2015, tobacco use caused 6.9% of the global disease burden as estimated by DALYs [2]. Current smokers who quit smoking lower their risk of non-communicable diseases like heart and respiratory disease, stroke and cancer [3].

According to the 2011 census, the total population of Kosovo is 1,739,825 inhabitants, of which 24% are 0-14 years old, 67% are 15-64 years old, and 9% are 65 and older [4]. In 2021, the crude birth rate was 12.8 ‰ and the crude death rate was 7.3‰ [5, 6]. The life expectancy at birth is 76.7 years (females 79.4 years vs. males 74.1 years). There are currently 38 municipalities and 1,469 settlements [7]. In 2018, circulatory system diseases were the leading cause of death in Kosovo, with neoplasms coming in second [8]. Because an electronic health information system has not yet been fully implemented, health statistics data are incomplete and fragmented. This STEPS survey provided internationally comparable weighted data on risk factors for non-communicable diseases (NCDs) in Kosovo. A previous study in 2011 has reported unweighted data and therefore its findings are difficult to interpret [9]. This study aimed to evaluate the prevalence of smoking among Kosovo adults by gender, age group and type of smoking using weighted data which are internationally comparable.

Methods

The survey was conducted using the WHO Stepwise Approach to surveillance (STEPS), [10].

Study design and sample

A population-based survey was conducted among people aged 18-69 years in Kosovo from April 2018 to June 2019 using the WHO STEPs instrument [10].

A two-stage cluster random sampling scheme was devised. To begin, 307 enumeration areas were chosen as primary

sampling units using probability proportional to size. Households were then randomly selected as the secondary sampling units. 2800 randomly selected households were approached. Within each of the households one resident aged 18-69 years was randomly selected for participation in the survey and 2695 (96.2%) agreed to participate.

The protocol was approved by the Committee on Ethical Issues, Kosovo Doctors Chamber nr. 06/2018. Written informed consent was obtained before participants were enrolled in the study, following ethical norms [11].

Measurements

To collect data for risk factors on NCDs s we have used the English 3.2 version of the WHO STEPS questionnaire [12, 13], which was translated and adapted from the Kosovo survey team. A STEPS questionnaire with core and expanded tobacco questions was used in face-to-face interviews to collect sociodemographic data and information on tobacco use (current and previous; frequency of smoking, duration of smoking, etc.). Showcards were customized for the local context and used to clarify terminology. All data were directly entered into a tablet by the survey team.

Statistical analysis

Weights were assigned to account for the following factors; selection probability, nonresponse, gender, and age differences between the sample and the target population. Data analysis was conducted in Epi Info [14], version 3.5.1 (Centre for Disease Control and Prevention, Atlanta, Ga) and prevalence rates with corresponding 95% confidence intervals (CIs) were estimated.

The results were considered statistically significant if there was no overlap between two CIs of comparing groups (e.g. males vs. females) or if there is $P<0.05$ if they are tested with the Chi test or Fisher exact test.

Results

There were 1115 men (41.4%) and 1580 women (58.6%) among the 2695 respondents to the survey. Almost 60% of all respondents were between the ages of 45 and 69, with similar proportions by gender.

The average time spent in school was 10.6 years. Nearly an equal number of respondents had completed secondary

education (34.2%) as had less than primary school education (34.1%), 12.9% had completed college/university, 7.8% had a primary school education, 4.2% had a postgraduate degree and 3.0% had high school degree. The vast majority (92.0%) of the population was identified as Albanian, with the remainder belonging to other ethnic groups.

Table 1. Respondents by age group and sex

Age Group (years)	Men		Women		Both Sexes	
	n	%	n	%	n	%
18-44	458	41.1	682	43.2	1140	42.3
45-69	657	58.9	898	56.8	1555	57.7
18-69	**1115**	**100.0**	**1580**	**100.0**	**2695**	**100.0**

More than a quarter of the population (25.7%) currently smoked tobacco. Men smoked more than twice as much as women (15.7%), and the difference was statistically significant. There were no significant differences in current smoking prevalence by age group and gender (Table 2).

Table 2. Percentage of current smokers by age group and gender – Kosovo STEPS survey 2019

Age Group (years)	Men			Women			Both Sexes			P-value
	n	% Current smoker	95% CI	N	% Current smoker	95% CI	n	% Current smoker	95% CI	
18-44	458	34.3	28.7-40.0	682	14.7	11.5-18.0	1140	24.6	21.4-27.9	P<0.0001 Chi test=59.3
45-69	657	37.8	33.2–42.5	892	19.0	15.9-22.2	1555	28.5	25.7-31.3	P<0.0001 Chi test=68.3
18-69	**1115**	**35.3**	**31.1-39.5**	**1580**	**15.9**	**13.3-18.6**	**2695**	**25.7**	**23.4-28.1**	P<0.0001 Chi test=134.8

The majority of current smokers (90.1%) smoked tobacco products daily, with no significant difference among men (91.5%) and women (87.1%), while the population in older age groups smoked more on a daily basis (Table 3).

Table 3. Current daily smokers among smokers by age and sex

Age Group (years)	Men			Women			Both Sexes			P-value
	N	% Daily smokers	95% CI	N	% Daily smokers	95% CI	n	% Daily smokers	95% CI	
18-44	163	89.8	83.0-96.7	115	83.4	74.4-92.3	278	87.9	82.3-93.6	P=0.214 Chi test = 1.54
45-69	253	95.2	91.5-99.0	161	94.6	90.8-98.5	414	95	92.0-98.1	P=1.000 Fisher test
18-69	**416**	**91.5**	**86.1-96.9**	**276**	**87.1**	**81.0-93.3**	**692**	**90.1**	**85.8-94.5**	P=0.356 Chi test = 0.85

The average age at which smokers began smoking was 19.3 years. Women started smoking significantly later than men, at 20.9 years compared to 18.6 years for men. The average smoking duration is 19.3 years, with no significant difference by gender (Men mean duration of 19.5 years vs. Women's mean duration of 19.0 years) (Table 4).

Table 4. Mean age when started smoking and mean duration of smoking, by sex (years)

Mean age started smoking									
Age Group (years)	Men			Women			Both Sexes		
	N	Mean age	95% CI	n	Mean age	95% CI	n	Mean age	95% CI
18-44	149	18.1	17.4-18.7	101	19.9	19.1-20.7	250	18.6	18.0-19.1
45-69	235	19.7	18.7-20.7	152	22.6	21.4-23.8	387	20.7	19.9-21.5
18-69	**384**	**18.6**	**18.0-19.1**	**253**	**20.9**	**20.2-21.6**	**637**	**19.3**	**18.8-19.7**

Mean duration of smoking									
Age Group (years)	Men			Women			Both Sexes		
	n	Mean duration	95% CI	n	Mean duration	95% CI	n	Mean duration	95% CI

18-44	149	12.5	11.0-14.0	101	12.4	10.3-14.6	250	12.5	11.2-13.8
45-69	235	35.1	33.7-36.6	152	30.8	29.5-32.2	387	33.7	32.6-34.8
18-69	**384**	**19.5**	**17.5-21.4**	**253**	**19**	**16.8-21.2**	**637**	**19.3**	**17.8-20.9**

On average, 97.4% of daily smokers smoke manufactured cigarettes, with no significant gender difference (Men 97.1% vs. Women 98.0%) (Table 5). On average, each smoker smoked 18.8 cigarettes per day. Women smoke 13.7 cigarettes per day, while men smoke 22.0 cigarettes per day. More than half of male smokers (54.7%) and over one-third of female smokers (38.8%) smoked 15-24 cigarettes per day; while 12.1% (men) and 38.3% (women) respectively, smoked 10-14 cigarettes per day (Table 6).

Table 5. Manufactured cigarette smokers among daily smokers by gender (%)

Manufactured cigarette smokers among daily smokers									
Age Group	**Men**			**Women**			**Both Sexes**		
(years)	n	% Manu-factured cigarette smoker	95% CI	n	% Manu-factured cigarette smoker	95% CI	n	% Manu-factured cigarette smoker	95% CI
18-44	151	97.8	95.0-100.5	101	98.1	96.0-100.2	252	97.9	95.8-99.9
45-69	242	95.7	92.5-99.0	151	97.7	94.2-101.2	393	96.4	93.9-98.9
18-69	**393**	**97.1**	**95.0-99.3**	**252**	**98**	**96.1-99.8**	**645**	**97.4**	**95.8-99.0**

Manufactured cigarette smokers among current smokers									
Age Group	**Men**			**Women**			**Both Sexes**		
(years)	n	% Manu-factured cigarette smoker	95% CI	n	% Manu-factured cigarette smoker	95% CI	n	% Manu-factured cigarette smoker	95% CI
18-44	162	97.3	94.4-100.1	114	95.1	90.5-99.8	276	96.6	94.3-99.0
45-69	250	95.1	91.6-98.5	159	96.6	92.8-100.4	409	95.6	93.0-98.2
18-69	**412**	**96.6**	**94.4-98.8**	**273**	**95.6**	**92.2-99.1**	**685**	**96.3**	**94.5-98.1**

Table 6. Number of manufactured or hand-rolled cigarettes smoked daily per smoker, by sex (%)

Percentage of daily smokers smoking given quantities of manufactured or hand-rolled cigarettes per day											
Age Group (years)	**Men**										
	N	% <5 Cigs.	95% CI	% 5-9 Cigs.	95% CI	% 10-14 Cigs.	95% CI	% 15-24 Cigs.	95% CI	% ≥ 25 Cigs.	95% CI
18-44	148	0.6	-2.4	2.8	-8.5	15.3	8.2-22.4	57.7	48.5-66.9	23.6	15.9-31.2
45-69	237	0.6	-1.8	2.6	0.2-5.1	4.8	1.0-8.6	48	40.5-55.5	43.9	36.4-51.4
18-69	**385**	**0.6**	**-1.7**	**2.7**	**-6.1**	**12.1**	**7.0-17.2**	**54.7**	**47.8-61.6**	**29.9**	**23.7-36.1**

Percentage of daily smokers smoking given quantities of manufactured or hand-rolled cigarettes per day											
Age Group (years)	**Women**										
	N	% <5 Cigs.	95% CI	% 5-9 Cigs.	95% CI	% 10-14 Cigs.	95% CI	% 15-24 Cigs.	95% CI	% ≥ 25 Cigs.	95% CI
18-44	99	2.9	-6.5	17.4	8.6-26.3	47.3	30.7-63.9	31.2	18.6-43.8	1.2	-3.5
45-69	150	3.7	0.4-6.9	9	3.7-14.3	22.5	14.8-30.1	52.3	41.6-62.9	12.6	5.7-19.6
18-69	**249**	**3.2**	**0.8-5.6**	**14.4**	**8.3-20.5**	**38.3**	27.4-49.2	**38.8**	**31.0-46.6**	**5.3**	**2.3-8.3**

Percentage of daily smokers smoking given quantities of manufactured or hand-rolled cigarettes per day											
Age Group (years)	**Both Sexes**										
	N	% <5 Cigs.	95% CI	% 5-9 Cigs.	95% CI	% 10-14 Cigs.	95% CI	% 15-24 Cigs.	95% CI	% ≥ 25 Cigs.	95% CI
18-44	247	1.3	0.1-2.5	6.9	3.1-10.8	24.4	16.6-32.1	50.2	42.2-58.2	17.2	11.6-22.8
45-69	387	1.6	0.4-2.9	4.7	2.2-7.2	10.6	6.9-14.3	49.4	43.3-55.5	33.5	27.7-39.4
18-69	**634**	**1.4**	**0.5-2.3**	**6.2**	**3.4-9.0**	**19.9**	**14.5-25.2**	**50**	**44.4-55.5**	**22.6**	**18.0-27.1**

Discussion

The WHO STEPs methodology for measuring risk factors for chronic diseases was used in this cross-sectional study. It is the second time Kosovo has conducted such research, but unlike the first time, when the data were presented unweighted, the data this time are weighted, allowing us to make a more accurate international comparison. It should be noted, however, that the target populations were not all the same age (18-69 years STEPS 2019 vs. 15-64 years STEPS 2011), [15]. Any comparison of these two data sets should be used only as e reference and not as evidence of changes in risk factor prevalence. The estimated smoking prevalence in STEPS (25.7%) is similar to the 2011 survey (28.4%), [16]. The study revealed a very high prevalence of smoking tobacco in Kosovo. One-fourth (25.7%) of the population aged 18-69 years was a current smoker, including one-third of all men (35.3%) and one-sixth (15.9%) of women. Compared to the data for tobacco users in the European Region these data are higher for men and lower for women. According to WHO in 2020, approximately one-third of men (33%) in the region used tobacco. Male current tobacco users numbered 117 million in the European Region in 2020, down from around 153 million (47%) in 2000; the figure is expected to fall to around 108 million (30%) by 2025. According to WHO, approximately one-fifth (18%) of women in the European Region used tobacco in 2020, which is higher than the smoking prevalence of Kosovo women (15.9%). Female current tobacco users in the European Region numbered 63 million in 2020, down from around 77 million (23%) in 2000; the figure is expected to fall further to around 60 million (17%) by 2025, [17-19]. Compared to data from STEPS 2011 prevalence of current tobacco smoking has trends to falling down [20].

Smoking prevalence varies greatly across European countries, with Eastern Europe (28%) having the highest prevalence and Northern Europe (20%) having the lowest [21]. The prevalence of smoking among adults in Kosovo is comparable to the prevalence of smoking in the majority of Balkan countries [22-29]. The majority of current smokers are daily smokers (90.1%) similar to the study from the ear 2011 (16). Kosovo's tobacco control law went into effect in May 2013, but the effect of this law

on smoking prevalence from 2011 to 2019 is small, indicating that the implementation of those measures is inadequate. The mean age when smokers started smoking was 19.3 years (Women 20.9 years vs. Men 18.6 years). Compared to 2011, the results of the 2019 STEPs survey show that the mean age is younger (in 2011 mean age was 20.9 years) as well as according to gender (in 2011 mean age for women was 23.4 years and for men 19.7 years). The results show that during the previous 30 days, more people noticed information encouraging people to quit smoking than cigarette advertisements, and nearly half of the current smokers (45.5%) considered quitting after seeing health warnings on cigarette packages, while every fifth current smoker (20.2%) had tried but failed to quit smoking.

Conclusions

The study found that smoking prevalence continues to be high in Kosovo. One-fourth (25.7%) of the population aged 18-69 years was a current smoker, including one-third of all men (35.3%) and one-sixth (15.9%) of women. Every fifth current smoker (20.2%) had attempted but failed to quit smoking. There has been no significant change in the current smoking prevalence estimates in this study compared to the 2011 STEPS study on the same population. Kosovo has a young population, with a high percentage of young males smoking. To reduce active and secondhand tobacco use in Kosovo, aggressive and long-term public health interventions are required.

Funding

The STEPS survey was organized by the Ministry of Health, the National Institute of Public Health of Kosovo and WHO, with the technical assistance of WHO and AQH (Accessible Quality Healthcare Project).

Conflicts of interest: None declared.

Author contributions

All the authors have contributed equally to the conception and design of the study, drafting the article or revising it, and approving the version to be submitted.

References

1. Organization, W.H., *WHO report on the global tobacco epidemic, 2017: monitoring tobacco use and prevention policies*. 2017: World Health Organization.
2. Collaborators, G.R.F., *Global, regional, and national comparative risk assessment of 79 behavioural,*

environmental and occupational, and metabolic risks or clusters of risks, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015. Lancet (London, England), 2016. **388**(10053): p. 1659.

3. Fenelon, A. and S.H. Preston, *Estimating smoking-attributable mortality in the United States.* Demography, 2012. **49**(3): p. 797-818.
4. Statistics, K.A.o., *Kosovo Population and Housing Census 2011—Final Results*. 2012, KAS Prishtina.
5. Statistics, K.A.o., *Birth statistics in Kosovo 2021, Pristina 2022. (Accessed 22.11.2022). Available on: Template for SOK publications in Albanian (rks-gov.net).*
6. Statistics, K.A.o., *Deaths statistics in Kosovo 2021, Pristina 2022. Available on: Template for SOK publications in Albanian (rks-gov.net).* 2022.
7. Statistics, K.A.o., *Kosovo in figures 2021, Pristina 2022. Available on: https://ask.rks-gov.net/media/6975/kosovo-in-figures-2021.pdf*. 2021.
8. Statistics, K.A.o., *Statistical Yearbook of Republic of Kosovo, 2018. Prishtina 2019. Available on: https://ask.rks-gov.net/media/5818/shkaqet-e-vdekjeve-2019.pdf*. 2018.
9. *Institute of Public Health of Kosova. Report of survey on risk factors for chronic disease. Prishtina, 2011.*
10. *STEPwise approach to surveillance (STEPS) [STEPS portal]. Geneva: World Health Organization (https://www.who.int/ncds/surveillance/steps/en).*
11. Organization, W.H., *Standards and operational guidance for ethics review of health-related research with human participants*. 2011: World Health Organization.
12. Organization, W.H., *WHO STEPS instrument (Core and Expanded): The WHO STEPwise approach to chronic disease risk factor surveillance (STEPS). Geneva*. 2014.
13. *STEPS user manual. Geneva: World Health Organization (https://www.who.int/ncds/surveillance/steps/eSTEPS_User_Manual.pdf).*
14. *Epi Info [download and information page]. Atlanta (GA): Centers for Disease Control and Prevention (https://www.cdc.gov/epiinfo/index.html).*
15. *National Institute of Public Health of Kosova. Report of survey on risk factors for chronic disease. Prishtina. 14 July 2011.*
16. Gashi, S., et al., *Smoking behaviors in Kosova: results of STEPS survey.* Slovenian Journal of Public Health, 2017. **56**(3): p. 158-165.
17. Organization, W.H., *WHO global report on trends in prevalence of tobacco use 2000-2025*. 2019: World Health Organization.
18. Organization, W.H., *European tobacco use: Trends report 2019*. 2019, World Health Organization. Regional Office for Europe.
19. Organization, W.H., *Global action plan for the prevention and control of noncommunicable diseases 2013-2020*. 2013: World Health Organization.
20. Gallus, S., et al., *Who smokes in Europe? Data from 12 European countries in the TackSHS survey (2017–2018).* Journal of

epidemiology, 2021. **31**(2): p. 145-151.
21. Seniori Costantini, A., et al., *Population health and status of epidemiology in Western European, Balkan and Baltic countries.* International Journal of Epidemiology, 2015. **44**(1): p. 300-323.
22. Vasilj, I., et al., *Cardiovascular risk factors research in Bosnia and Herzegovina.* Collegium antropologicum, 2009. **33**(2): p. 185-188.
23. Pilav, A., et al., *Cardiovascular risk factors in the Federation of Bosnia and Herzegovina.* The European Journal of Public Health, 2007. **17**(1): p. 75-79.
24. Ross, H., et al., *Results from the Albanian Adult Tobacco Survey.* Central European Journal of Public Health, 2008. **16**(4).
25. Shapo, L., et al., *Prevalence and determinants of smoking in Tirana city, Albania: a population-based survey.* Public Health, 2003. **117**(4): p. 228-236.
26. Samardžić, S., G. Vuletić, and D. Tadijan, *Five-year cumulative incidence of smoking in adult Croatian population: the CroHort study.* Collegium antropologicum, 2012. **36**(1): p. 99-103.
27. Poljičanin, T., et al., *The changing pattern of cardiovascular risk factors: the CroHort study.* Collegium antropologicum, 2012. **36**(1): p. 9-13.
28. Koprivnikar, H. and A. Korošec, *Age at smoking initiation in Slovenia.* Slovenian Journal of Public Health, 2015. **54**(4): p. 274-281.
29. Martínez-Sánchez, J.M., et al., *Smoking behaviour, involuntary smoking, attitudes towards smoke-free legislations, and tobacco control activities in the European Union.* PloS one, 2010. **5**(11): p. e13881.