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Influence of smoking on changes in indicators of bronchitis, asthma and lung cancer- comparison on the example of Poland, Malta and other European Union countries

Abstract

Introduction. Smoking is associated with respiratory diseases. Despite declining smoking rates, asthma and chronic bronchitis cases rose between 2014 and 2019. Quitting smoking is vital for managing asthma and reducing the risks of bronchitis and lung cancer.

Aim. A correlational study of smoking prevalence and its association with asthma, bronchitis and lung cancer in people from Malta, Poland and the EU in 2008/2014/2019.

Materials and methods. Integration and comparison of statistical data from EUROSTAT – (EHIS) 2008/2014/2019, ISAAC; ESPAD, 2014/2015, ECIS 2020.

Results. Smoking habits exhibit notable gender disparities, with 24% of Polish men and 23% of Maltese men being regular smokers, compared to women (Poland – 15%, Malta – 16%). While male smoking rates have declined, especially in Poland, female rates persist. In 2019, asthma affected 5.6% of the EU adult population, with Poland at 4.1% and Malta at 6%. Chronic bronchitis is more prevalent in Poland (3%) than Malta (1%). In 2020, lung cancer rates among men varied slightly between Poland and Malta (120.0; 100.3 per 100.000). However, the incidence among women is twice as high in Poland (53.1; 23.9 per 100.000).

Conclusions. Malta's elevated asthma rate, despite comparable smoking rates, hints at additional risk factors like traffic. Poland's increased bronchitis rate likely stems from higher historical smoking. The doubled lung cancer incidence in Polish women suggests a passive smoking connection. The burden of bronchitis intensifies due to high smoking rates in men over 50. Addressing smoking rates can potentially address respiratory disease rates, but other risk factors should also be identified and managed.

Keywords: Tobacco smoking, Asthma, Bronchitis, Lung cancer.

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INTRODUCTION

The health consequences of cigarette smoking are now well understood, and epidemiological studies show that tobacco smoking is one of the most important, single, and at the same time preventable causes of death in the world. Cigarette smoking is one of the leading causes of death worldwide [1]. According to the WHO (World Health Organization) data from 2020, approximately 1.3 billion people present symptoms of tobacco addiction. In Poland, in 2019, the prevalence of smoking was 24.3% among men and 14.9% among women, respectively. In Malta, 23.0% for men and 16.3% for women [2-10]. Considering that the health effects of smoking cigarettes are observed after a few or even several dozen years from the start of smoking, according to the WHO estimates, by 2030, deaths caused by tobacco-related diseases will have exceeded 8 million annually. The negative impact of tobacco smoke on the course of asthma, chronic bronchitis and lung cancer [3-7] is complex. It includes a direct toxic effect on the respiratory epithelium, activation of inflammatory cells, and thus worsening the course of the disease [11-14] In developed countries, approximately 25% of adult asthmatics are smokers.

Knowledge about the scale of addiction and its connection with the development of respiratory diseases allows us to optimize effective actions. The percentage of smokers among lung cancer patients is approximately 80-90% [15-17]. It is believed that the risk of disease increases with the number of cigarettes smoked and the duration of smoking, expressed in so-called pack-years [18,19].

Therefore, the aim of this study was to analyze the incidence of smoking in individuals from Poland, Malta and the European Union and to compare the prevalence of bronchial asthma, bronchitis and lung cancer in these populations.

MATERIALS AND METHODS

The prevalence of tobacco smoking among adults in Malta, Poland and the European Union in 2014 and 2019, and in the group of people aged 11-18 in 2014, 2018 and 2023 was analyzed [1,3-10]. The analysis also included the occurrence of asthma, chronic bronchitis and lung cancer among people over 18 years old in Malta, Poland and the European Union. In our review, we included and compared statistical data from the European Statistical Office EUROSTAT [1,4,9], ISSAC, EHIS 2019/2020 [5-6]; 2014/2015 [7-8], ESPAD, ECIS 2020.

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RESULTS

First of all, the popularity of smoking depends on the gender of the respondents. In Poland one third of men (27.9%) smoke daily, including 24.3% who smoke regularly. This is a clear difference compared to women, of whom 17.8% smoke and 14.9% smoke regularly. The decline in the number of smokers visible in recent years is mainly due to men [1,4-8].

In Malta the frequency of cigarette smoking among males in 2014 was similar to that in 2019 (27%, 28% respectively, including occasional smokers) [4-8].

Across the European Union, the smoking popularity in 2019 was at its highest in Bulgaria (28.7%), Greece (23.6%), Latvia (22.1%) and Germany (21.9%). In contrast, the popularity of smoking was the lowest in Sweden (6.4%), Finland (9.9%), Luxembourg (10.5%) and Portugal (11.5%) [5-10].

At the country level, the countries with the biggest shares of male daily smokers were Bulgaria (38%), Latvia (35%), Romania (31%), Cyprus (30%), Lithuania (29%), while female ones were Bulgaria (20%), Croatia (19%), Germany (18%), Greece (17%) [4-10].

In all EU countries, the proportion of daily cigarette smokers was higher among men than among women, apart from in Sweden and Denmark. In Sweden, the share of men who smoked daily was 0.9% less than the share of daily female smokers, while in Denmark the proportion of male smokers who smoked daily was 0.1% less than the share of daily female smokers [1-10].

Attention should be paid to the amount of smoking females in both countries. In Poland in 2019, 14.9% of women were daily smokers and in Malta – 16.3%. Although in 2019 the number of women smoking in Poland was lower than in Malta, in 2014 and 1997 it was the opposite. In 2014 the amount of female smokers was higher in Poland (17.3%) than in Malta (16.4%). In 1997 the proportion of women smoking in Poland was 17.9% and in Malta 15.1%. Comparatively, in 1997, 30.9% males were smoking in Poland, compared to Malta's 23.8% [1-10].

Lung cancer in Malta remains the most frequent cause of cancer death. In 2022, the number of lung cancer cases among males was 100.3 (per 100.000) and 23.9 (per 100.000) in females. In Poland it was 120.1 (per 100.000) in males and 53.1 (per 100 000) in females. The prevalence of lung cancer among Polish women is twice as high as in Malta [16,17,19,23-25].

In children, the frequency of smoking depends largely on age. Smoking in 11-year-old Polish boys is less common in 2023 than before. In 2014, 4% of Polish 11-year-old boys smoked cigarettes, now it is 1%. In Malta, the number of 11-year-old boys smoking cigarettes was 1.7% in 2014. Now it is 1% (the same as in Poland). The same trend can be noticed among girls. In 2014 in Poland, 2% of girls aged 11 smoked, now 0.7% smoke. In Malta it was 1% and dropped 13-year-old Polish boys who smoked (now – less than 5%). In Malta, there has also been a down to 0.5% [5-10].

Smoking cigarettes in the age group of 13 is more popular. In 2014 there was 11% of decline in the number of 13-year-old boys who smoke from 4% to 1%. The biggest differences can be noticed among 13-year-old Polish girls, because from 2014 the number of smoking girls decreased by 9% (from 13% to 4.3% in 2023). In Malta the number of 13-year-old girls has changed from 4.3% to 1% [5-10].

However, there is a noticeable annual increase in the prevalence of adolescents using electronic cigarettes. In 2020, data from Poland revealed that 1.4% of 11-year-olds, 8.9% of 12-year-olds, and 8.4% of 13-year-olds engaged in electronic cigarette usage. In the previous year, 2019, Malta reported that 8% of male adolescents aged 13-15 used electronic cigarettes, significantly lower than the corresponding 33% in Poland. Similarly, among female counterparts in the same age group in Malta, the prevalence of electronic cigarette usage was 7%, in contrast to the 28% reported in Poland.

In Poland almost 12.2% of 15-year-old boys smoke. Compared to Maltese boys of the same age, it is more than 7.7% difference. Maltese 15-year-old boys smoke less than the average for the European Union. The situation is similar among 15-year-old girls. In Poland, the number of girls smoking has decreased since 2014 from 24% to 12.1% in 2023, but it is still much higher. This amount is relatively high compared to Malta or other European Union countries (Malta 4.9%, EU 12.1%).

In 2019, asthma affected 5.6% of the European Union population, representing a 0.3 percentage point increase compared to 2014. Finland reported the highest prevalence of asthma, with 9% of its population affected. The top three also include Germany and France, both with an 8% prevalence. Malta reported a 6% prevalence, while Poland reported a rate of 4.1%. In contrast, only 2% of people in both Romania and Bulgaria reported having this disease [12-13].

Compared with 2014, the largest increase in the prevalence of asthma occurred in Germany (+1.9 percentage points), Croatia (+1.8 pp), and Belgium (+1.5 pp). On the other hand, the largest decrease in the number of people with asthma was recorded in Ireland (-1.7 pp), Greece (-1.1 pp), and France (-1.0 pp) in 2019 [12-14].

Asthma occurs more often in women compared to cigarette smoking, which is less common among women and has decreased compared to 2014. More women than men reported having asthma (6% vs. 5%). The highest prevalence of asthma among both sexes and all age intervals is in 65 and above [12-14].

Chronic bronchitis disease occurs more often in both genders in Poland than in Malta. In Malta, in 2008, there were 0.8% of cases of chronic bronchitis in male and 1.5% in females. In Poland the prevalence of bronchitis was 2.9% in male and 3.1% in females [15].

DISCUSSION

The study showed that cigarette smoking is higher in Poland than in Malta and the European Union in old age groups and both genders. The prevalence of cigarette smoking is, therefore, relatively high, especially among men, who smoke almost twice as often as women, which is probably due to cultural patterns [1-10,27,30,31]. High levels of smoking, especially among men, are also characteristic of other populations, mainly in the countries of Central and Eastern Europe. A very high percentage of smokers is recorded in Bulgaria (38.1%), Latvia (35.9%), and Romania (30.2%). The analysis carried out on the basis of EUROSTAT for the entire population of given countries showed that the smoking addiction in the Polish population affected 24.3% of men and 14.9% of women, while in the Maltese population it was 23% and 16.3%, respectively. The European average for men is 23.4% and for women 15.5%. Comparison of the results of the study with data from 2014 shows a decrease in the incidence of smoking

also among boys and girls in all age categories in all European Countries. The recorded positive trend is mainly due to the increase in health awareness and extensive anti-smoking, as well as economic and legislative activities [30-32].

The analysis showed that cigarette smoking was significantly related to gender, age and country of residence. The research "Cigarette smoking in Poland in 2019: the continuing decline in smoking prevalence" highlights a correlation between smoking and education levels in Poland. The prevalence is highest among those with primary or lower secondary education (34%) and basic vocational education (33%), while individuals with higher education exhibit a lower smoking rate at only 17%. Additionally, in socio-professional groups, unskilled workers (49%) and the unemployed (45%) show higher smoking rates, possibly suggesting lower health awareness and potential links to other addictive behaviors [33,35,39-42]. This may have an impact on the number of asthma detected due to the fact that these patients do not report to the doctor.

The study also presents research results comparing cigarette smoking in people under 18 years of age. The frequency of smoking among adolescents was assessed in 3 age categories (11-, 13-, 15- year-old) for both sexes. It was found that in Europe, the problem of cigarette smoking among young people strongly depends on age, gender and place of residence. The countries with the highest percentage of smoking among children aged 11 were in Greenland (2.7% boys), Malta (1.7% boys), Republic of Moldova (1.7% boys), Lithuania (1.4% girls).

In children aged 13, the highest percentage of smoking was in Greenland (7% boys, 8.4% girls), Hungary (4.9% girls) and Poland (4.7% boys).

In the European Union, Greenland and Croatia have the highest rates of smoking among 15-year-olds: 20% of boys and 19.6% of girls in Greenland, 17.7% girls and 15.4% boys in Croatia.

The study also compared the percentage of people suffering from asthma in the European Union, Poland and Malta. In Poland (2014-2019), asthma decreased among males (4.7% to 3.4%), potentially linked to reduced male smokers. Females saw an increase (4.6% to 4.8%) despite fewer female smokers. Malta noted rising asthma rates in both genders. Additionally, from 2014 to 2019 throughout the European Union, a pattern was observed in the number of people suffering from asthma, while the number of smokers decreased.

As can be seen, there is no correlation between the impact of smoking on the incidence of asthma in specific age groups, genders or countries of origin. However, we can compare and agree with other scientific literature that smoking tobacco increases the chances of worsening asthma symptoms and worsens the prognosis for long-term health.

The principles of effective combat and control of asthma, according to GINA (Global Initiative for Asthma) experts, include, among others, minimizing its symptoms and leading to complete recovery. One of the important elements of the fight against the disease is the elimination of inflammatory factors that trigger inflammatory processes in the respiratory system, which contribute to the occurrence of asthma symptoms. It should be emphasized that one of the most important factors stimulating these processes is tobacco smoking. People suffering from asthma should, therefore, avoid active and passive exposure to tobacco smoke.

The authors of other studies emphasize that the relationship with the severity of asthma symptoms correlates with the number of cigarettes smoked and level of smoking addiction.

Lung cancer is currently the most common cancer in the world among men and women, also in Poland. Although it occurs more often in men, this proportion is changing – more and more women are affected. One of the most important risk factors for developing lung cancer is active and passive smoking. The risk of lung cancer is higher in people who started smoking cigarettes at a young age or who have been smoking for a long time. The probability of developing cancer decreases significantly within a few years of quitting smoking, but only after 15-20 years does it approach the level typical of non-smokers. The risk of developing lung cancer depends primarily on the duration of the addiction and the number of cigarettes smoked. Smoking 1-4 cigarettes a day increases the risk of lung cancer 3-fold in men and 5-fold in women [11-14,16-18,24-26,32,33].

In the 1980s, the percentage of women smoking in Poland was twice as high as in Malta. This difference persisted until 1994. In 2000, a higher proportion of women smoked in Malta. Between 1999 and 2009, the incidence of lung cancer was twice as high among women in Poland than in Malta. In 2013, the number of lung cancer patients differed only by 3.49 people per 100,000 inhabitants in both countries. Since 2004, the percentage of women who smoke has varied between these countries by 1-2%, and from 2013 to 2022, the incidence of lung cancer in women in Poland was almost twice as high as in Malta. Comparing the percentage of women smoking in Poland and Malta over the past 25 years, it can be noted that smoking was much more prevalent in the past [35,37]. Passive exposure to tobacco smoke among Polish women may have had an impact, considering that the incidence of lung cancer in this population is twice that of Malta in 2022. The above-presented result indicates that lung cancer, which is twice as common in Polish women as in Maltese women, is associated with a higher percentage of past smoking among Polish women. These differences in smoking habits between the countries may partially explain the twofold higher occurrence of lung cancer among Polish women compared to Maltese women in 2022 [1-10,16,17,19,27,37].

The notion that chronic bronchitis is influenced by smoking is not new. A recent prospective British birth cohort study documented that smoking-related chronic bronchitis often resolves after smoking cessation. In clinical practice, repeated evaluation for the presence or absence of the chronic bronchitis syndrome could have great implications for an individual patient's prognosis, generate suspicion for new comorbid conditions or complications, and raise the possibility of identifying new environmental exposures and intensifying or resuming cigarette smoking.

Furthermore, successful abstinence from smoking has important short- and long-term patient-centered effects by reducing symptoms and improving lung function [18,38].

The discussed issues of tobacco smoking among young and elderly people are part of the widely discussed issue of patients' non-compliance with doctor's recommendations, as well as the lack of appropriate knowledge and education about the harmful effects of smoking on health and life. We can assume that in all European Union countries, prevention and education about smoking are widespread, but it is difficult to predict why such a large percentage of the population still

smokes. Taking a closer look at the statistical data, one can notice a significant impact of health education on the decline in the number of smokers in the last 5 years, but the further dissemination of knowledge about the harmful effects of active and passive tobacco smoking on health and life cannot be stopped [35,39,41].

CONCLUSION

1. Gender greatly affects smoking habits in Poland, predominantly among men.
2. Smoking contributes to bronchitis development, particularly concerning men over 50.
3. Prioritizing comprehensive smoking control initiatives is crucial for preventing lung cancer among women, given tobacco's significant role as a risk factor.
4. Despite similar smoking rates, Malta's higher asthma rate indicates potential additional risk factors, e.g. traffic pollution.
5. Further primary research is warranted to evaluate association at individual level.
6. Poland's elevated bronchitis rate likely stems from a higher historical smoking prevalence.
7. The doubled lung cancer incidence in Polish women hints at a past link to passive smoking.

REFERENCES

1. Smoking of tobacco products by sex, age and country of birth. Eurostat Data Browser; 2023. [https://ec.europa.eu/eurostat/databrowser/view/hlth_ehis_sk1c/default/table?lang=en] (access: 01.10.2023).
2. World Health Organization Regional Office for Europe. European tobacco use: Trends report 2019. World Health Organization; 2019. [https://www.euro.who.int/__data/assets/pdf_file/0009/402777/Tobacco-Trends-Report-ENG-WEB.pdf.] (access:25.05.2023)
3. Data and statistics: World Health Organization Regional Office for Europe. [https://www.who.int/europe/data] (access: 16.08.2023).
4. European Statistical Office EUROSTAT: Population and social conditions; Health; Health determinants; Tobacco consumption; Smoking of tobacco products by sex, age and country of birth, People reporting a chronic disease, by disease, sex, age and educational attainment level (%). [https://ec.europa.eu/eurostat/databrowser/view/hlth_ehis_sk1c/default/table?lang=en] (access: 16.08.2023).
5. Smoking of tobacco products by sex, age and country of birth. European Health Interview Survey (EHIS); 2019/2020. [https://ec.europa.eu/eurostat/cache/metadata/en/hlth_det_esms.htm] (access: 01.10.2023).
6. European Health Interview Survey (EHIS) 2019/2020; Smoking of tobacco products by sex, age and country of citizenship. [https://ec.europa.eu/eurostat/databrowser/view/hlth_ehis_sk1c/default/table?lang=en] (access: 01.10.2023).
7. Smoking of tobacco products by sex, age and country of citizenship. European Health Interview Survey (EHIS); 2014/2015. [https://ec.europa.eu/eurostat/databrowser/view/hlth_ehis_sk1c/default/table?lang=en] (access: 01.10.2023).
8. Smoking of tobacco products by sex, age and country of birth. European Health Interview Survey (EHIS); 2014/2015. [https://ec.europa.eu/eurostat/cache/metadata/en/hlth_det_esms.htm] (access: 01.10.2023).
9. Tobacco consumption statistics. EUROSTAT; 2023. [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Tobacco_consumption_statistics] (access: 01.10.2023).
10. Janik-Konieczny K, Zatoński W, Zatońska K, et al. Cigarette smoking in Poland in 2019: the continuing decline in smoking prevalence. *J Health Inequalities*. 2020;6(2):87-94.
11. Lai CKW, Beasley R, Crane J, et al. Global variation in the prevalence and severity of asthma symptoms: phase three of the International Study of Asthma and Allergies in Childhood (ISAAC). *Thorax*. 2009;64:462-3.
12. Pietinalho A, Pelkonen A, Ryttilä P, et al. Linkage between smoking and asthma. *Eur J Clin Immunol*. 2009;64(12):1722-7.
13. Asher MI, Keil U, Anderson HR, et al. International Study of Asthma and Allergies in Childhood (ISAAC): rationale and methods. *Eur Respir J*. 1995;8(3):483-91.
14. Głowacka E. Usefulness of eicosanoids in exhaled breath condensate (EBC) analysis in children with asthma. Kraków: Uniwersytet Jagielloński; 2021.
15. Respiratory diseases statistics. EUROSTAT, 2022. [https://ec.europa.eu/eurostat/databrowser/view/hlth_ehis_sk1c/default/table?lang=en] (access: 01.10.2023).
16. Lung cancer burden in EU-27. ECIS, 2022. [https://visitors-centre.jrc.ec.europa.eu/en/media/infographics/lung-cancer-burden-eu-27] (access: 10.11.2023).
17. Lung cancer incidence. ECIS; 2020. [https://ecis.jrc.ec.europa.eu/factsheets.php] (access: 10.11.2023)
18. Doll R, Peto R, Boreham J, et al. Mortality in relation to smoking: 50 years' observations on male British doctors. *BMJ*. 2004;328(7455):1519.
19. Estimates of cancer incidence and mortality in 2022, for all countries. ECIS; 2022. [https://ecis.jrc.ec.europa.eu/] (access: 01.11.2023).
20. Pace-Asciak R, Dalmás M, Gatt M, et al. The First National Health Interview Survey, 2003. Malta: Department of Health Information; 2003.
21. Pace-Asciak R, Camilleri M, Azzopardi-Muscat N. Public Health Report Malta 2002. Health Behaviour Survey in Schoolchildren. Malta: Department of Health Information; 2002.
22. Use of electronic cigarettes or similar electronic devices by sex, age and educational attainment level. EUROSTAT; 2022. [https://ec.europa.eu/eurostat/databrowser/explore/all/popul?lang=en&subtheme=hlth_hlth_det_hlth_smok&display=list&sort=category&extractionId=hlth_ehis_sk1i] (access: 01.10.2023).
23. Rodu B, Cole P. The burden of mortality from smoking: comparing Sweden with other countries in the European Union. *Eur J Epidemiol*. 2004;19(2):129-31.
24. Nance R, Delaney J, McEvoy JW, et al. Smoking intensity (pack/day) is a better measure than pack-years or smoking status for modeling cardiovascular disease outcomes. *J Clin Epidemiol*. 2017;81:111-9.
25. Carioli G, Malvezzi M, Bertuccio P, et al. European cancer mortality predictions for the year 2021 with focus on pancreatic and female lung cancer. *Ann Oncol*. 2021;32(4):478-87.
26. Blot WJ, McLaughlin JK. Are women more susceptible to lung cancer? *J Nat Cancer Inst*. 2004;96:812-813.
27. Herrera AM, Corvalán MP. Adolescents and smoking. *Rev Chil Pediatr*. 2017;88(6):927-34.
28. Preventing tobacco use among youth and young adults. A report of the surgeon general. Atlanta (GA): Centers for Disease Control and Prevention (US); 2016.
29. SDDS: Smoking, Drinking and Drug Use Among Young People in England. SDDS; 2022. [https://digital.nhs.uk/data-and-information/publications/statistical/smoking-drinking-and-drug-use-among-young-people-in-england] (access: 16.08.2023).
30. Gilpin EA, White MM, Messer K, et al. Receptivity to tobacco advertising and promotions among young adolescents as a predictor of established smoking in young adulthood. *Am J Public Health*. 2007;97(8):1489-95.
31. Spotlight on adolescent health and well-being. Findings from the 2017/2018 Health Behaviour in School-aged Children (HBSC) survey in Europe and Canada. International report. Volume 2. Key data. World Health Organization; 2019. [https://iris.who.int/bitstream/handle/10665/332104/9789289055017eng.pdf?sequence=1&isAllowed=y] (access: 5.10.2023)
32. Halpern MT, Gillespie BW, Warner KE. Patterns of absolute risk of lung cancer mortality in former smokers. *J Natl Cancer Inst*. 1993;85(6):457-64.
33. Goldenberg MDO, Danovitch I, IsHak WW. Quality of life and smoking. *Am J Addict*. 2014;23(6):540-62.
34. Riaz SP, Riaz SP, Lüchtenborg M, et al. Trends in incidence of small cell lung cancer and all lung cancer. *Lung Cancer J*. 2012;75:280-4.
35. Feliu A, Filippidis FT, Joossens L, et al. Impact of tobacco control policies on smoking prevalence and quit ratios in 27 European Union countries from 2006 to 2014. *Tob Control*. 2019;28(1):101-9.
36. Pesch B, Kendzia B, Gustavsson P, et al. Cigarette smoking and lung cancer – relative risk estimates for the major histological types from a pooled analysis of case-control studies. *Int J Cancer*. 2012;131(5):1210-9.
37. Pauk N, Kubík A, Zatloukal P, et al. Lung cancer in women. *Sci Direct*. 2005;48:1-9.
38. Pirie K, Peto R, Reeves GK, et al. The 21st century hazards of smoking and benefits of stopping: a prospective study of one million women in the UK. *Lancet*. 2013;381(9861):133-41.
39. Bosdriesz JR, Willemsen MC, Stronks K, Kunst AE. Socioeconomic inequalities in smoking cessation in 11 European countries from 1987 to 2012. *J Epidemiol Community Health*. 2015;69(9):886-92.

40. Giesinger I, Goldblatt P, Howden-Chapman P, et al. Association of socioeconomic position with smoking and mortality: the contribution of early life circumstances in the 1946 birth cohort. *J Epidemiol Community Health*. 2014;68(3):275-9.
41. Bosdriesz JR, Willemsen MC, Stronks K, et al. Tobacco control policy and socio-economic inequalities in smoking in 27 European countries. *Drug Alcohol Depend*. 2016;165:79-86.
42. Lavery AA, Vardavas CI, Filippidis FT. Prevalence and reasons for use of Heated Tobacco Products (HTP) in Europe: an analysis of Eurobarometer data in 28 countries. *Lancet Reg Health Eur*. 2021;8:100159.
43. Prevalence of tobacco and e-cigarette use in young people in the WHO European region. Eurostat Data Browser; 2022. [<https://www.who.int/europe/publications/m/item/prevalence-of-tobacco-and-e-cigarette-use-in-young-people-in-the-who-european-region>] (access: 16.08.2023).

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