



Citation for published version:

EUREST-PLUS consortium 2020, 'Do smokers want to protect non-smokers from the harms of second-hand smoke in cars? Findings from the EUREST-PLUS ITC Europe Surveys', *European Journal of Public Health*, vol. 30, no. Supplement 3, pp. iii108-iii112. <https://doi.org/10.1093/eurpub/ckaa056>

DOI:

[10.1093/eurpub/ckaa056](https://doi.org/10.1093/eurpub/ckaa056)

Publication date:

2020

Document Version

Peer reviewed version

[Link to publication](#)

This is a pre-copyedited, author-produced version of an article accepted for publication in *European Journal of Public Health* following peer review. The version of record EUREST-PLUS consortium 2020, 'Do smokers want to protect non-smokers from the harms of second-hand smoke in cars? Findings from the EUREST-PLUS ITC Europe Surveys', *European Journal of Public Health*, vol. 30, no. Supplement 3, pp. iii108-iii112. is available online at: <https://doi.org/10.1093/eurpub/ckaa056>

University of Bath

Alternative formats

If you require this document in an alternative format, please contact:
openaccess@bath.ac.uk

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Do smokers want to protect nonsmokers from the harms of secondhand smoke in cars? Findings from the EUREST-PLUS ITC Europe Surveys.

Authors/Affiliations

Sarah O Nogueira^{1,2,3,4}, Olena Tigova^{1,2,4}, Pete Driezen^{5,6}, Marcela Fu^{1,2,3,4}, Christina N. Kyriakos^{7,8}, Mateusz Zatonski^{9,10,11}, Ute Mons¹², Anne C K Quah⁵, Tibor Demjén¹³, Antigona C. Trofor^{14,15}, Krzysztof Przewoźniak^{9,16,17}, Paraskevi A. Katsaounou^{18,19}, Geoffrey T. Fong^{5,6,20}, Constantine I. Vardavas^{7,8,17}, Esteve Fernández^{1,2,3,4}, on behalf of the EUREST-PLUS Consortium*

- 1 Cancer Epidemiology and Prevention Department, Catalan Institute of Oncology (ICO), L'Hospitalet de Llobregat, Spain
- 2 Tobacco Control Unit, Bellvitge Biomedical Research Institute (IDIBELL), L'Hospitalet de Llobregat, Spain
- 3 School of Medicine and Health Sciences, University of Barcelona (UB), Barcelona, Spain
- 4 Consortium for Biomedical Research in Respiratory Diseases (CIBER en Enfermedades Respiratorias, CIBERES), Madrid, Spain
- 5 Department of Psychology, University of Waterloo, Waterloo, Canada
- 6 School of Public Health and Health Systems, University of Waterloo, Waterloo, Canada
- 7 European Network for Smoking and Tobacco Prevention (ENSP), Brussels, Belgium
- 8 School of Medicine, University of Crete, Heraklion, Greece
- 9 Health Promotion Foundation, Warsaw, Poland
- 10 Tobacco Control Research Group, Department for Health, University of Bath, Bath, United Kingdom
- 11 European Observatory of Health Inequalities, President Stanislaw Wojciechowski State University of Applied Sciences, Kalisz, Poland
- 12 Cancer Prevention Unit and WHO Collaborating Centre for Tobacco Control, German Cancer Research Center (DKFZ), Heidelberg, Germany
- 13 Smoking or Health Hungarian Foundation (SHHF), Budapest, Hungary
- 14 University of Medicine and Pharmacy 'Grigore T. Popa' Iasi, Iasi, Romania
- 15 Aer Pur Romania, Bucharest, Romania
- 16 Maria Sklodowska-Curie National Research Institute of Oncology, Warsaw, Poland
- 17 Collegium Civitas, Warsaw, Poland

- 18 First ICU Evaggelismos Hospital Athens, National and Kapodistrian University of Athens, Athens, Greece
- 19 European Respiratory Society, Lausanne, Switzerland
- 20 Ontario Institute for Cancer Research, Toronto, Canada

*EUREST-PLUS Consortium members listed in Acknowledgements

Corresponding author

Dr Esteve Fernández

Cancer Epidemiology and Prevention Department, Catalan Institute of Oncology (ICO), L'Hospitalet de Llobregat, Spain

Av. Granvia de L'Hospitalet, 199-203; 08908 L'Hospitalet de Llobregat, Spain

Tel.: (+34) 93 260 7357; email: efernandez@iconcologia.net

FUNDING

The EUREST-PLUS project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 681109 (C. I. V.) and the University of Waterloo (G. T. Fong). Additional support was provided to the University of Waterloo by the Canadian Institutes of Health Research (FDN-148477). G. T. Fong was supported by a Senior Investigator Grant from the Ontario Institute for Cancer Research. E. Fernández, S. O. Nogueira, O. Tigova and M. Fu are partly supported by Ministry of Universities and Research, Government of Catalonia (2017SGR319) and by the Instituto Carlos III and co-funded by the European Regional Development Fund (FEDER) (INT16/00211 and INT17/00103), Government of Spain. S. O. Nogueira has received funding from the European Union's 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No. 713673. S. O. Nogueira has received financial support through the "La Caixa"

INPHINIT Fellowship Grant for Doctoral studies at Spanish Research Centres of Excellence, "La Caixa" Banking Foundation, Barcelona, Spain. SON, EF, MF and OT thank CERCA Programme / Generalitat de Catalunya for institutional support.

CONFLICT OF INTEREST

GTF has served as an expert witness on behalf of governments in litigation involving the tobacco industry. KP reports grants and personal fees from the Polish League Against Cancer, outside the submitted work.

Acknowledgements

***EUREST-PLUS consortium members:**

European Network on Smoking and Tobacco Prevention (ENSP), Belgium: Constantine I. Vardavas, Andrea Glahn, Christina N. Kyriakos, Dominick Nguyen, Katerina Nikitara, Cornel Radu-Loghin, Polina Starchenko. **University of Crete (UOC), Greece:** Aristidis Tsatsakis, Charis Girvalaki, Chryssi Igoumenaki, Sophia Papadakis, Aikaterini Papathanasaki, Manolis Tzatzarakis, Alexander I. Vardavas. **Kantar Public, Belgium:** Nicolas Bécuwe, Lavinia Deaconu, Sophie Goudet, Christopher Hanley, Oscar Rivière. **Smoking or Health Hungarian Foundation (SHHF), Hungary:** Tibor Demjén, Judit Kiss, Anna Piroska Kovacs. **Tobacco Control Unit, Catalan Institute of Oncology (ICO) and Bellvitge Biomedical Research Institute (IDIBELL), Catalonia:** Esteve Fernández, Yolanda Castellano, Marcela Fu, Sarah O. Nogueira, Olena Tigova. **Kings College London (KCL), United Kingdom:** Ann McNeill, Katherine East, Sara C. Hitchman, Máirtín McDermott, Sarah Aleyan. **Cancer Prevention Unit and WHO Collaborating Centre for Tobacco Control, German Cancer Research Center (DKFZ), Germany:** Ute Mons, Sarah Kahnert. **National and Kapodistrian University of Athens (UoA), Greece:** Yannis Tountas, Panagiotis Behrakis, Filippos T. Filippidis, Christina Gratziou, Paraskevi Katsaounou, Theodosia Peleki, Ioanna Petroulia, Chara Tzavara. **Aer Pur Romania, Romania:** Antigona Carmen Trofor, Marius Eremia, Lucia Lotrean, Florin Mihaltan. **European Respiratory Society (ERS), Switzerland:** Gernot Rohde, Tamaki Asano, Claudia Cichon, Amy Far, Céline Genton, Melanie Jessner, Linnea Hedman, Christer Janson, Ann Lindberg, Beth Maguire, Sofia Ravara, Valérie Vaccaro, Brian Ward. **Maastricht University, the Netherlands:** Marc Willemsen, Hein de Vries, Karin Hummel, Gera E. Nagelhout. **Health Promotion Foundation (HPF), Poland:** Witold A. Zatoński, Aleksandra Herbec, Kinga Janik-Koncewicz, Krzysztof Przewoźniak, Mateusz Zatoński. **University of Waterloo (UW), Canada:** Geoffrey T. Fong, Thomas K. Agar, Pete Driezen, Shannon Gravely, Anne C. K. Quah, Mary E. Thompson.

ABSTRACT

Background

There is currently no comprehensive legislation to protect nonsmokers and children from secondhand smoke (SHS) exposure in private cars at the European Union (EU) level, which is regulated only at the national level. This study aims to assess smokers' support for smoke-free cars legislation in six EU countries.

Methods

Data come from the EUREST-PLUS ITC Europe Surveys: Wave 1 (2016, n=6011) and Wave 2 (2018, n=6027) in Germany, Greece, Hungary, Poland, Romania, and Spain. Support for smoke-free cars carrying pre-school children and nonsmokers and voluntary implementation of smoke-free cars were assessed among adult smokers. Generalised estimating equations models were used to assess changes in support between waves.

Results

In 2018, 96.3% (95%CI:95.4%-97.0%) of the overall sample supported smoke-free legislation for cars carrying pre-school children, which represents an increase of 2.4 percentage points in comparison to 2016. Smoke-free legislation for cars transporting non-smokers was supported by 85.2% (95%CI:83.1%-87.1%) of smokers' in 2016 and 90.2% (95%CI:88.6%-91.7%) in 2018. Among smokers who own cars, there was a significant increase of 7.2 percentage points in voluntary implementation of smoke-free cars carrying children from 2016 (60.7%, 95%CI:57.2%-64.0%) to 2018 (67.9%, 95%CI:65.1%-70.5%). All sociodemographic groups of smokers reported support higher than 80% in 2018.

Conclusion

The vast majority of smokers in all six EU countries support smoke-free legislation for cars carrying pre-school children and nonsmokers. This almost universal support across countries and sociodemographic groups is a clear indicator of a window of opportunity for the introduction of comprehensive legislation to protect nonsmokers and children from SHS exposure in cars.

KEYWORDS

Smoke-free cars, support for smoke-free policies, voluntary, Europe

INTRODUCTION

Secondhand smoke (SHS) is one of the most widespread air pollutants in indoor environments(1). There is no safe level of SHS exposure(2), and when it occurs in confined environments, such as cars, it is particularly harmful because of the small volume of space(3). SHS exposure in cars is even more harmful to children because of their inability to avoid exposure and their faster breathing rate(4–6). In 2017, 1.2 million deaths were attributable to SHS exposure, with 63.822 being among those children aged ten or younger(7). Although the implementation of smoke-free cars legislation in some jurisdictions has been associated with a drastic decrease in exposure to SHS(8), there is currently no comprehensive legislation to protect nonsmokers in private cars at the European Union (EU) level, apart from isolated initiatives, for example, the ones in the United Kingdom(UK, 8) and Italy(9).

The successful implementation of and compliance with tobacco control policies may be influenced by their level of support among smokers(10). Specifically, the level of support to smoke-free cars legislation among smokers may be an important indicator of the future level of adherence to such regulations. Thus, the objective of this study is to assess the support for smoke-free private cars legislation among a cohort of European smokers assessed in 2016 and followed-up in 2018.

METHODS

Study design

This study is part of the European Commission Horizon-2020 funded study “European Regulatory Science on Tobacco: Policy Implementation to Reduce Lung Disease” (EURESTPLUS- HCO-06-2015). The data comes from the International Tobacco Control Policy Evaluation Six European Country (ITC 6E) Surveys, a cohort assessed in 2016 and followed up in 2018 that aims to evaluate psychosocial and behavioural impacts of the EU Tobacco Products Directive. The sample is comprised of smokers (>100 cigarettes in their lifetime and smoking currently at least monthly) aged 18 or older in six EU countries: Germany, Greece, Hungary, Poland, Romania, and Spain. Respondents who could not be reached at Wave 2 were replaced by other smokers selected using the same sampling frame and the same random selection approach, as done in other ITC study cohorts(11). Retention rates ranged from 36% in Hungary to 71% in Germany and Spain, with an average of 53% for the full sample. Further details about the EUREST-PLUS ITC surveys methodology and questionnaires can be found elsewhere(12–14).

Cross-sectional survey weights have been constructed for each of the survey waves in each country. After all, data were collected; each respondent was assigned a sampling weight according to their wave of recruitment. For those respondents present in both 2016 and 2018 waves, the sampling weight was their 2016 wave cross-sectional weight, rescaled to sum to the sample size for each country. For respondents newly recruited in 2018, the sampling weight was based on the cross-sectional weight rescaled to sum to the sample size of the 2018 wave recruits in each country. Weights were calibrated using national surveys from each of the respective countries.

Measures

Support for smoke-free cars legislation was assessed within a pool of questions: 'At which of the following places do you think smoking SHOULD be allowed: 1) In cars with pre-school children in them?, 2) In cars with nonsmokers in them?'. The possible answers were: 'yes', 'no', 'do not know', and 'refused'. These answers were re-coded as not supportive of the smoke-free cars legislation ('yes') and supportive ('no', 'do not know', 'refused').

Prevalence of voluntary implementation of smoke-free cars was assessed with the following question: 'What are the rules about smoking in your car or cars when there are children in the car?' The possible answers were: 'smoking is never allowed in any car', 'smoking is sometimes allowed or in some cars', 'smoking is allowed in all cars', 'do not have a car/you never have children in your car', and 'refused'. These possible answers were re-coded as "smoking never allowed" vs "otherwise". Answers 'do not have a car', 'never have children in car', and 'refused' were excluded from the analyses.

The sociodemographic variables assessed were country, age group (18–24, 25–39, 40–54 and ≥55), sex (female, male), and degree of urbanisation (urban, intermediate, rural). Additionally, the highest level of formal education completed, categorised as low (primary; lower pre-vocational secondary, middle pre-vocational secondary), moderate (secondary vocational; senior general secondary and pre-university), and high (higher professional and university bachelor, university master), using the International Standard Classification of Education was assessed. Monthly gross household income was assessed and categorised as low (<€1750 for Germany, Greece & Spain, ≤150,000 Ft for Hungary, ≤2,000 zł for Poland, ≤1,000 lei for Romania), moderate

(€1750 to €3000, 150,001 Ft to 250,000 Ft, 2,001 zł to 4,000 zł, 1,001 lei to 2,500 lei) and high (>€3000, >250,000 Ft, >4,000 zł, >2,500 lei). . The level of nicotine dependence was calculated with the Heaviness of Smoking Index (HSI), a measure of cigarette dependence categorised into three groups for analysis (0–1: low, 2–4: moderate, 5–6: high)(15).

Analysis

All analyses included weighting to make the sample representative for all six countries' populations and to adjust for the complex sampling design. A full description of the weighting process is detailed in an online technical report and other resources (9,11). Percentages of change were estimated from a logistic generalised estimating equations regression model to test the overall change in smoke-free measures between Wave 1 and Wave 2. One model was estimated per each policy. Percentages are adjusted estimates that control for the EU country, degree of urbanisation, time-in-sample (one wave only or both waves), sex, age group, income, education, and HSI. All analyses were conducted using SAS-callable SUDAAN Version 11.0.1.

RESULTS

Prevalence of smokers' support for smoke-free cars legislation in both waves can be found in Table 1. The support was very high in all countries, being over 90% when children are present and over 85% when nonsmokers are present in Wave 2.

From Wave 1 to Wave 2, there was a significant increase in the support for smoke-free legislation for cars with pre-school children present in three countries (Hungary, Poland, and Spain). The changes in the support ranged from 3.5 percentage points increase in Poland to 5.6 percentage points increase in Hungary. No significant changes occurred in Germany, Greece, and Romania. There was a significant increase in the support between waves in all age groups (except in the 40-64 group), with the highest increase among young participants (aged 18-24), who were the ones with the lowest prevalence of support to the ban in both waves. Similarly, support for smoke-free cars legislation significantly increased both among females and males and in the moderate group of nicotine dependence.

Support for smoke-free legislation for cars with nonsmokers also increased significantly between 2016 and 2018 among the same three countries (Hungary, Poland, and Spain). The increase ranged from 7.3 (Hungary) to 12.2 (Spain) percentage points. All age groups (except those aged 55+), both genders, and those with low and moderate nicotine dependence also exhibited a significant increase in support for smoke-free cars legislation when nonsmokers are present.

We restricted the analysis to those respondents who owned a car and reported carrying children in them (n=6133). In such analysis, there was a significant increase of 7.2 percentage points in voluntary implementation of smoke-free cars from Wave 1 (60.7,

95%CI: 57.2 to 64.0) to Wave 2 (67.9, 95%CI: 65.1 to 70.5; results not presented in the table).

Table 1. Smokers' support for smoke-free cars legislation in six European countries (2016 and 2018)

| | Support (%) (and 95% confidence interval) for smoke-free legislation for cars with pre-school children in them, n = 8762 | | | Support (%) (and 95% confidence interval) for smoke-free legislation for cars with non-smokers in them, n = 8740 | | |
|--|--|---------------------|-------------------------|--|---------------------|-------------------------|
| | Wave 1 (2016) | Wave 2 (2018) | Difference ^a | Wave 1 (2016) | Wave 2 (2018) | Difference ^a |
| Overall | 93.8 (92.4 to 95.0) | 96.3 (95.4 to 97.0) | 2.4 (0.93 to 4.0) | 85.2 (83.1 to 87.1) | 90.2 (88.6 to 91.7) | 5.0 (2.4 to 7.7) |
| <i>Country</i> | | | | | | |
| Germany | 95.4 (93.0 to 97.0) | 95.7 (93.3 to 97.3) | 0.3 (-2.1 to 2.7) | 85.0 (80.4 to 88.7) | 85.3 (79.4 to 89.7) | 0.3 (-6.3 to 7.0) |
| Greece | 98.2 (96.6 to 99.1) | 96.9 (93.6 to 98.5) | -1.3 (-3.1 to 0.5) | 86.8 (82.6 to 90.1) | 96.9 (93.6 to 98.5) | -1.3 (-3.1 to 0.5) |
| Hungary | 90.8 (86.6 to 93.8) | 96.4 (94.7 to 97.6) | 5.6 (1.8 to 9.3) | 86.2 (81.4 to 89.9) | 93.4 (91.2 to 95.2) | 7.3 (2.8 to 11.7) |
| Poland | 90.1 (86.2 to 92.9) | 93.6 (91.0 to 95.5) | 3.5 (0.1 to 6.9) | 83.1 (77.4 to 87.7) | 92.7 (89.9 to 94.7) | 9.5 (4.4 to 14.6) |
| Romania | 97.0 (95.3 to 98.1) | 98.3 (96.7 to 99.0) | 1.2 (-0.5 to 3.0) | 94.6 (91.8 to 96.5) | 96.5 (94.3 to 97.9) | 1.9 (-0.8 to 4.6) |
| Spain | 91.5 (87.4 to 94.4) | 96.7 (92.2 to 97.8) | 5.3 (1.7 to 8.8) | 76.0 (70.7 to 80.5) | 88.1 (84.5 to 91.0) | 12.2 (6.8 to 17.5) |
| <i>Age group</i> | | | | | | |
| 18-24 | 91.5 (87.7 to 94.2) | 95.7 (93.2 to 97.7) | 4.2 (0.6 to 7.8) | 78.5 (72.7 to 83.3) | 90.0 (86.2 to 92.8) | 11.5 (5.3 to 17.7) |
| 25-39 | 94.1 (92.3 to 95.5) | 96.1 (94.8 to 97.1) | 2.0 (0.1 to 4.0) | 84.0 (81.4 to 86.2) | 90.8 (88.8 to 92.4) | 6.8 (3.9 to 9.6) |
| 40-54 | 94.5 (92.7 to 95.8) | 96.4 (95.1 to 97.4) | 2.0 (-0.1 to 4.0) | 86.4 (83.7 to 88.7) | 91.1 (89.1 to 92.7) | 4.6 (1.5 to 7.8) |
| 55+ | 93.6 (91.6 to 95.1) | 96.4 (94.8 to 97.5) | 2.8 (0.8 to 4.8) | 87.8 (85.3 to 89.9) | 88.5 (85.5 to 91.0) | 0.7 (-3.0 to 4.4) |
| <i>Sex</i> | | | | | | |
| Female | 94.7 (93.0 to 96.0) | 96.8 (95.7 to 97.6) | 2.1 (0.3 to 3.9) | 88.0 (85.8 to 89.9) | 92.3 (90.7 to 93.6) | 4.3 (1.8 to 6.8) |
| Male | 93.1 (91.6 to 94.4) | 95.9 (94.8 to 96.7) | 2.7 (1.0 to 4.5) | 83.1 (80.6 to 85.3) | 88.7 (86.6 to 90.4) | 5.6 (2.4 to 8.8) |
| <i>Nicotine dependence (HSI index)</i> | | | | | | |
| Low | 94.3 (92.4 to 95.7) | 96.4 (94.8 to 97.6) | 2.1 (-0.1 to 4.3) | 88.9 (86.3 to 91.1) | 92.2 (89.7 to 94.1) | 3.2 (0.0 to 6.5) |
| Moderate | 94.1 (92.7 to 95.2) | 96.3 (95.3 to 97.1) | 2.2 (0.7 to 3.7) | 84.7 (82.4 to 86.7) | 89.8 (88.0 to 91.4) | 5.2 (2.4 to 7.9) |
| High | 78.0 (73.1 to 82.3) | 84.0 (79.0 to 88.1) | 6.0 (-0.7 to 12.7) | 91.0 (87.2 to 93.8) | 93.2 (89.2 to 95.8) | 2.1 (-2.6 to 6.9) |

^a Percentage of changes were estimated from a logistic generalised estimating equations regression model to test the overall change in smoke-free measures between Wave 1 and Wave 2. Percentages are adjusted for country, degree of urbanisation (urban, intermediate and rural), time-in-sample (one wave only or both waves), sex, age group, income (low, moderate and high), education (low, moderate and high), and smoking status (daily or non-daily).

DISCUSSION

The findings from this study show that the vast majority of smokers in all six EU countries support smoke-free legislation for cars carrying pre-school children and nonsmokers. This near-unanimous support is a clear indicator of a window of opportunity for the introduction of legislation to protect children and nonsmokers from SHS exposure in cars. While smokers' support for smoke-free cars legislation was higher than 90%, only around 70% of smokers reported implementing voluntary smoke-free rules in their vehicles while carrying children. The enactment of legislation for smoke-free cars could likely be a positive trigger for smokers who support such legislation but are still not protecting others from their smoking.

Notably, despite the already high support for smoke-free cars legislation in Wave 1, support increased significantly between survey waves. As expected, the largest increases occurred in countries that previously had the lowest support, which led to a reduction in variation between countries. Our findings on the increases of support for smoke-free cars legislation might be associated with changes in pictorial health warnings recently introduced by the new EU Tobacco Products Directive(16). The new warnings include explicit messages about the harms of SHS exposure to children and nonsmokers (17). Another evidence that might support this assumption is the findings from a study indicating a relationship between allowing smoking in cars with nonsmokers and knowledge of SHS harms in Australia, Canada, the UK, and the United States(18).

Regulating smoking in private settings might be challenging, but given that some other European countries have introduced similar laws may ease the promotion of these regulations in other EU countries. For instance, in the UK, support for smoke-free cars legislation among smokers has increased significantly after the implementation of

smoke-free legislation for cars carrying children, from around 60% in 2014 to 82% in 2017(8). This indicates that the introduction of such legislation might not come with a rebound effect on population support to it. Furthermore, compliance with the smoke-free legislation has been associated with public opinion support for it(19), and, as shown by our results, support is almost unanimous.

With regards to sociodemographic groups, it is interesting to note that compared to older age groups, lower level of support of smoke-free cars legislation was observed among younger respondents (aged 18-24) in Wave 1; nevertheless, they were the group with the highest increase in the level of support for such legislation between 2016 and 2018, reaching support levels that are comparable to the older age groups.

Our paper was restricted to private cars. However, there are interesting findings related to the relationship of voluntary smoke-free rules in cars and houses that have been explored in the North American, but not the European context(20). Further research should be conducted to understand the similarities, differences and influences of smoke-free rules in private settings such as home and the ways of how having bans in each of them influence the implementation of bans in the other and, by consequence, the exposure to SHS.

The findings of this study are subjected to limitations. As support levels were already very high at Wave 1, ceiling effects might limit the potential for further increases. Self-reporting limits the accuracy of the data, especially concerning the prevalence of voluntary implementation of smoke-free cars. As an attempt to minimise such bias, those reporting applying only partial voluntary smoke-free rules in cars were included in the same group as those applying no rules. Finally, there is the potential for social desirability bias, as questions related to children might be especially sensitive to answer. In any case, this potential source of bias would operate similarly in both waves,

and hence the percentage change between waves would not be biased. In terms of strengths, the sample of this study was representative of six EU countries population aged ≥ 18 years old. Additionally, the same sampling design was used in each country, allowing comparisons between countries. In our study, we chose to dichotomise the “legislation support” in a rigorous way so that those smokers who were not sure about their support or opposition to the legislation (do not know answers) were included in the oppose-legislation group.

CONCLUSIONS

In conclusion, the vast majority of smokers in all six EU countries support banning smoking in cars carrying pre-school children and nonsmokers. This near-universal support across countries and sociodemographic groups, along with the increase in voluntary implementation of smoke-free cars rules regulation, are clear indicators of a window of opportunity for the introduction of comprehensive legislation to protect nonsmokers and children from SHS exposure in cars.

KEY POINTS

- There is currently no comprehensive legislation at the EU level to protect nonsmokers and children from SHS exposure in private cars.
- This study aimed to examine smokers’ support for smoke-free cars legislation in six EU countries and the prevalence of voluntary smoke-free cars among smokers in 2016 and 2018.

- We found a significant increase in the support for smoke-free legislation in private cars carrying pre-school children and nonsmokers, reaching an overall level of support above 90% in 2018.
- Our results point to a clear opportunity for the introduction of legislation to protect nonsmokers and children from SHS exposure in cars.

REFERENCES

1. Oberg M, Jaakkola MS, Woodward A, Peruga A, Pruss-Ustun A. Worldwide burden of disease from exposure to secondhand smoke: a retrospective analysis of data from 192 countries. *Lancet* 2011;377:139–46.
2. US Department of Health and Human Services. The health consequences of involuntary exposure to tobacco smoke: a report of the Surgeon General. Atlanta, GA: US Dept. of Health and Human Services, Centers for Disease Control and Prevention, Coordinating Center for Health Promotion, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2006.
3. Jones MR, Navas-Acien A, Yuan J, Breyse PN. Secondhand tobacco smoke concentrations in motor vehicles: a pilot study. *Tob Control* 2009;18:399–404.
4. Bearer CF. Environmental health hazards: how children are different from adults. *Futur Child* 1995;5:11–26.

5. Semple S, Apsley A, Galea KS, MacCalman L, Friel B, Snelgrove V. Secondhand smoke in cars: assessing childrens potential exposure during typical journey conditions. *Tob Control* 2012;21:578–83.
6. Kabir Z, Manning PJ, Holohan J, Keogan S, Goodman PG, Clancy L. Second-hand smoke exposure in cars and respiratory health effects in children. *Eur Respir J* 2009;34:629–33.
7. GBD 2017 Collaborators and others. Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet* 2018;392:1923-94.
8. Faber T, Mizani MA, Sheikh A, Mackenbach JP, Reiss IK, Been J V. Investigating the effect of England's smoke-free private vehicle regulation on changes in tobacco smoke exposure and respiratory disease in children: a quasi-experimental study. *Lancet Public Heal* 2019;4:607–17.
9. Gallus S. Second-hand smoke in Italy. *Eur J Paediatr Dent* 2015;16:257.
10. Francis JA, Abramsohn EM, Park H-Y. Policy-driven tobacco control. *Tob Control* 2010;19 Suppl 1:16–20.
11. ITC Project. ITC Four Country Tobacco and E-cigarette Project, Wave 1 (4CE1) Technical Report. University of Waterloo; Medical University of South Carolina; Cancer Council Victoria; 2018 Apr.
12. Vardavas CI, Bécuwe N, Demjén T, Fernández E, McNeill A, Mons U, et al. Study Protocol of European Regulatory Science on Tobacco (EUREST-PLUS): Policy implementation to reduce lung disease. *Tob Induc Dis* 2018;16:A2.

13. Fong GT, Thompson ME, Boudreau C, Bécuwe N, Driezen P, Agar TK, et al. The Conceptual Model and Methods of Wave 1 (2016) of the EUREST-PLUS ITC 6 European Countries Survey. *Tob Induc Dis* 2018;16:A3.
14. Thompson, ME; Driezen, P; Boudreau C et al. Methods of the International Tobacco Control (ITC) EUREST-PLUS ITC Europe Surveys. *Eur J Public Health* 2020 Feb 13. pii: ckz212. doi: 10.1093/eurpub/ckz212. [Epub ahead of print]
15. Borland R, Yong H-H, O'Connor RJ, Hyland A, Thompson ME. The reliability and predictive validity of the Heaviness of Smoking Index and its two components: findings from the International Tobacco Control Four Country study. *Nicotine Tob Res* 2010;12 Suppl S:45–50.
16. European Parliament EC. Directive 2014/40/EU of the European Parliament and of the Council of 3 April 2014 on the approximation of the laws, regulations and administrative provisions of the Member States concerning the manufacture, presentation and sale of tobacco and related pr. *Off J Eur Union* 2014;L127/121-L.
17. Trofor A, Papadakis S, Lotrean L, Radu-Loghin L, Eremia M, Mihaltan F. Knowledge of the health risks of smoking and impact of cigarette warning labels among tobacco users in six European countries: Findings from the EUREST-PLUS ITC Europe Surveys. *Tob Induc Dis* 2019;16:A10.
18. Hitchman SC, Fong GT, Borland R, Hyland A. Predictors of smoking in cars with nonsmokers: findings from the 2007 Wave of the International Tobacco Control Four Country Survey. *Nicotine Tob Res* 2010;12:374–80.

19. Fong GT, Hyland A, Borland R, Hammond D, Hastings G, McNeill A, et al.
Reductions in tobacco smoke pollution and increases in support for smoke-free public places following the implementation of comprehensive smoke-free workplace legislation in the Republic of Ireland: findings from the ITC Ireland/UK Survey. *Tob Control* 2006;15 Suppl 3:51–8.

20. Parks MJ, Kingsbury J, Boyle R, Evered S. Smoke-Free Rules in Homes and Cars Among Smokers and Nonsmokers in Minnesota. *Prev Chronic Dis* 2018;15:E32.