D9.2 Recommendations for research on forward-looking tobacco control policies and tobacco endgame strategies

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Work Package 9 Best practices to develop an effective and comprehensive tobacco endgame strategy (Objective 9.1, Task 9.1c)

Review authors: Lead THL and ISPRO, others (in alphabetical order) ICO, IPHS, NIJZ, NPHO, OKPI, SPFrance, UCY

Research recommendations authors: Lead THL, others (in alphabetical order) DGS, ICO, HSE, MoH-FR, MoH-IT, MoH-NL, NIJZ, NPHO, OKPI, UCY.

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Abstract

Due to the continued detrimental effects of tobacco use, a growing number of countries are embracing the idea of tobacco endgame, meaning ending the tobacco epidemic instead of controlling it. This review aims to synthesize and update the evidence from earlier scientific reviews on effective tobacco endgame measures, as well as to assess their integration to current national strategies among European countries with official tobacco endgame goals. The synthesis of the prior scientific literature found most evidence on product-focused and some evidence for supply-focused policies. Less to little evidence was detected for user- and institutional-focused measures. An update for the tobacco-free generation measure showed uncertainty in reducing smoking prevalence, especially for adolescents' reactions to age-restrictive laws. All the countries that established a tobacco endgame strategy have included product standards in their measures, predominantly based on European Union regulations on conventional tobacco products, yet standards above this level and considering other products were also common. Cessation measures were given strong emphasis in strategies, yet none of the countries linked these to specific endgame measures. Despite commonly mentioning vulnerable groups, such as youth and pregnant women, adoption of measures to reduce tobacco use among these groups was scarce. Lastly, the decline in tobacco use seems to be modest, implying challenges in meeting the endgame goals. To meet these goals, European countries should reinforce the implementation of known effective tobacco control measures such as tax increases. Furthermore, new innovative strategies and measures to meet the objective of an endgame should be explored. This report D9.2 "Recommendations for research on forward looking tobacco control policies and tobacco endgame strategies" consists of specific research recommendations, followed by a review article which is published in its final form in Tobacco Prevention & Cessation -journal, with reference available on the title page.

Research recommendations

Upon conducting the literature review under task 9.1c, the WP9 partners have formulated the following specific recommendations for strengthening research on forward-looking tobacco control policies and tobacco endgame strategies:

- Establish and maintain a national surveillance system for monitoring tobacco and nicotine control in line with the Article 20 (Research, surveillance and exchange of information) of the WHO FCTC[1]
- Designate a responsible entity for national monitoring (e.g., public health institute, statistical office, university department)
- Define key indicators and target groups for regular monitoring, and whenever possible, ensure their comparability to other countries by aligning the definitions, age groups etc. with indicators and target groups used in the European region, especially in the EU
- Monitor changes in indicators, including among groups with vulnerabilities (e.g., children and adolescents, pregnant women) and high prevalence of tobacco or nicotine use
- Develop and maintain a reporting mechanism (e.g., statistical yearbook, online database) to facilitate the availability of national data for regulators, policymakers, and researchers
- Ensure that information and studies from manufacturers and importers are made publicly available in accordance with the provisions of Article 5 (para 4,6,7) and Article 20 (para 7,8,9) of the Tobacco Products Directive (2014/40/EU) to facilitate their use in research
- Supplement national language reports with English abstracts and key words to facilitate their identification as potential data sources for international research or comparisons
- Build collaboration with civil society, universities, and media to gain visibility for the research findings
- When new policies or a new strategy is planned:

1 Supporting materials are available from the WHO FCTC Knowledge Hub on Surveillance. Available at: https://extranet.who.int/fctcapps/fctcapps/fctc/kh/surveillance

  - develop an evaluation plan which sets a timeline and responsibilities of different stakeholders
  - assess the need for additional indicators, data sources, and target groups
  - identify and document other parallel or recent policy changes that might influence the results (e.g., tax increases) and, if possible, collect data related to these
  - collect data on population support for key policy measures or strategy elements
  - aim for a comprehensive pre-evaluation and regulatory impact assessment (RIA) analysis utilizing national and international research on similar or related interventions, including modelling studies
  - compile information on relevant country experiences of full or partial implementation, especially in case scientific evidence is lacking
  - whenever possible, conduct both quantitative and qualitative research and assess the level of implementation and compliance with the policies
  - develop a sustainability plan considering all parameters (e.g. budget, staff, etc) that will contribute to the long-term continuation, monitoring and evaluation of a successful new policy or strategy for tobacco control policies and tobacco endgame strategies
- Promote research on tobacco endgame strategies and forward-looking tobacco control measures, especially on less studied measures such as supply-side policies
- Promote research on novel tobacco and nicotine products
- Promote research on the best buys of cessation programs (e.g., linking cessation counseling to screening, health promotion programs, etc.) and their integration to tobacco endgame strategies
- Support initiatives that facilitate research on tobacco endgame strategies and forward-looking tobacco control measures also in low-income countries, as there is little evidence on the feasibility and effectiveness of implementing endgame strategies at earlier stages of the tobacco epidemic
- Be mindful of Article 5.3 of the WHO FCTC in research and tobacco control monitoring:
  - Do not engage in partnerships or other collaboration with tobacco industry or related entities with vested interests (e.g., front groups such as the Foundation for a Smoke-Free World)
  - Do not accept funding or other resource support from these entities
  - Do not allow representatives of these entities to be members in any publicly funded scientific or ethics committees, advisory groups or in other bodies that have a role in evaluation or regulatory impact assessment, and require a Declaration of Interest (DoI) statement in these positions.
  - When conducting research, evaluation, and regulatory impact assessment (RIA) analysis, build on robust peer-reviewed studies and refrain from the use of tobacco industry funded studies.
  - Identify and prepare for critical risk situations where the industry or related entities are likely to challenge the evidence by trying to interfere with policymaking
  - When possible, document and monitor industry interference attempts in research and more widely, for instance in relation to circumventing bans on tobacco advertising, promotion and sponsorship, as this facilitates research on industry tactics and provides evidence of these activities at national and transnational level, helping policymaking and raising public awareness in line with the Article 12 of the WHO FCTC

Introduction

Since 2005, key global tobacco control regulations have been harmonized through the entry into force of the World Health Organization Framework Convention on Tobacco Control (WHO FCTC). While most focus has been on the implementation of the measures required and recommended in the WHO FCTC, recently more attention is being given to Article 2.1, which encourages countries to implement measures beyond the treaty to provide ultimate protection of health. This aligns with the paradigm shift where more and more countries are embracing the idea of tobacco endgame – meaning ending the tobacco epidemic instead of reducing and controlling it[1].

Tobacco endgame is usually defined as aiming for a minimal level of tobacco use in the general population – preferably with a measurable goal in a clearly defined time frame[1]. Following the developments at national level, a "Tobacco-Free Generation" goal was set for the EU member states in 2021 in the Europe's Beating Cancer Plan[2]. This has been defined in practice as reaching <5% tobacco use prevalence by 2040 at the EU-level. As the prevalence of smoking among adults in the EU was 23% in 2020[3], reaching the target likely requires both stronger implementation of established key regulations – WHO FCTC including the MPOWER "best buys" – as well as implementation of other innovative measures described specifically for reaching the tobacco endgame.

In the implementation roadmap of the EU Cancer Plan[4], the "Tobacco-Free Generation" goal is addressed through foreseen revisions of key EU tobacco directives for product regulation, marketing, and taxation. Furthermore, the EU-funded Joint Action on Tobacco Control 2 (JATC2) project is expected to facilitate implementation of tobacco control measures through enhanced collaboration between the European countries. Work package 9 (WP9) of JATC2 specifically addresses the best practices to develop effective and comprehensive tobacco endgame strategies.

To facilitate the understanding of tobacco endgame strategies and the development of national goals, this narrative review aims, first, to synthesize and update the findings of earlier scientific reviews on the evidence of effective tobacco endgame measures and research needs. Second, it seeks to investigate the current situation in Europe focusing on the contents of the endgame strategies and adaptation of different measures in countries having set an endgame goal. The so called harm reduction or harm modification measures, often promoted by the tobacco industry as alternatives for smoking[5], such as the use of electronic cigarettes or heated tobacco products, have not been considered in WP9 as tobacco endgame measures. Any harm reduction measures should be used to supplement, not replace tobacco control policies and thus, tobacco endgame measures should aim at ending the use of tobacco and other nicotine products.

Specifically, the research questions (RQs) are:

1) What is the current knowledge on the effectiveness of proposed tobacco endgame measures and what are the research needs?
2) Among European countries with official tobacco endgame goals, how has 'endgame' been operationalized in their national strategies?
   a. How has the tobacco endgame been defined in these countries?
   b. Have tobacco endgame measures been included in the strategies? Has support for tobacco cessation been integrated in the strategies?
   c. Have vulnerable population groups been considered in the development, implementation, and evaluation of tobacco endgame goal?
   d. Is the progress towards the endgame goal being evaluated?
   e. Are the countries progressing towards the endgame goal with the selected measures?

Methods

RQ1. Synthesis of existing literature

The most recent comprehensive review on tobacco endgame was first identified through a consultation with experts within the JATC2 WP9. This review by Puljević et al.[6], was an update of a previous one by McDaniel et al.[1] and included 49 publications through a search on five databases (PubMed, CINHAL, SCOPUS, Web of Science, Embase) and the inclusion of additional reports from a Google search and expert opinion[6]. This review described endgame policies and identified endgame gaps and research priorities.

Since the Puljević et al.[6] review refers to recently published papers (search up to 2021), an update was carried out only for feasible policies for which there were evidence gaps, by applying the same search string used by Puljević and colleagues[6] to an updated timeframe (see Supplementary Material for the search string). A policy was defined feasible in Europe on the basis of an expert opinion in JATC2 WP9 on its possible advocacy and social acceptability. The literature on each policy measure was considered sufficient if more than five papers were identified on the topic.

RQ2. Inclusion criteria for endgame countries

The second aim of this narrative review was to identify countries that adopted a tobacco endgame goal in Europe. In this study, an endgame country refers to a country that has defined an endgame goal aiming at a minimal level or no tobacco use in the population in an official governmental document. The focus was outlined on European countries corresponding with the definition of the target group of the JATC2. The search of governmental strategy documents and other relevant publications such as news pieces of regulatory changes indicating the existence of a tobacco endgame goal was conducted between August 2022 and January 2023. The initial search was first done by one author and later confirmed by three other authors. Based on the search, ten countries were included in the analyses: Belgium, Finland, France, Ireland, Netherlands, Norway, Slovenia, Sweden, and as part of the United Kingdom, England and Scotland. The data on the existence of tobacco endgame goals and strategies were complemented as needed by information provided in the answers gathered with the JATC2 WP9 questionnaire on tobacco endgame strategies. The questionnaire was distributed to all the WHO FCTC focal points in the WHO European region from 15 September 2022 until January 13 2023. Its methodology and results have been described elsewhere [7].

Measures

Policies that have been identified to have a potential to achieve a tobacco endgame were selected and grouped into product, user, market/supply and institutional structure oriented as well as other innovative tobacco control measures based on two earlier endgame reviews and syntheses[1, 6]. In the WP9 of the JATC2, one task was to assess the integration of tobacco cessation support to tobacco endgame strategies, and therefore it was also assessed whether smoking cessation measures were included in the strategy and whether they related to specific endgame measures.

After selecting the countries and the policies, a further search of policy documents, governmental websites, scientific articles and media coverage, such as news, was conducted to assess what measures had the countries adopted to achieve the tobacco endgame goal. Texts in local language were used with the help of digital translator services, as needed. WP9 partners in each country did the final check of the gathered information and the translation to ensure factuality. In the case of identification of previous endgame policy documents for a country, only the latest one was taken into consideration. However, in some cases (such as England), the policy documents were overlapping yet not mutually exclusive. In these cases, more than one policy document was reviewed.

Evaluation plan and vulnerable populations

The contents of the governmental tobacco endgame documents were assessed for mentions on a possible evaluation plan and on vulnerable populations, such as children, people with a low socio-economic position, and those experiencing mental illness. The countries were considered to have an evaluation plan if the strategy documents included concrete actions on how to evaluate or monitor the strategy implementation. The documents were also examined to determine whether vulnerable populations were considered in the strategy, for example by mentioning how tobacco use affects different population groups. Then it was assessed whether there were concrete actions described on how vulnerable populations are considered for example in the implementation of the strategy.

Prevalence of use

Four authors selected indicators that describe smoking, tobacco use, e-cigarette use, and smokeless tobacco use to get a comprehensive picture of the level of product use in the included countries. Indicators reported by the WHO were selected because of the comparability of the data.

Results

RQ1. Synthesis of existing scientific reviews

Tobacco endgame policies were grouped into four broad categories as aforementioned: product-focused, user-focused, market/supply-focused and institutional structure-focused (Table 1)[1, 6]. Based on aspects of policy implementation, the authors identified policies that reached an evidence synthesis, i.e., for which results from multiple empirical studies were identified, selected and combined to draw conclusions[8]. This was done by considering evidence synthesis as an indicator of progression towards translation of research evidence into policy[6] (Table 1).

Table 1. Synthesis of existing scientific review by Puljević et al.[6] on endgame measures and update on tobacco-free generation policies.

Policy category	Policy description	Sufficient literaturea (n studies in Puljević et al.[6])	Main evidence	Main evidence gaps
Product-focused	1. Mandate very low nicotine content (VLNC) for smoked tobacco products to make them non-addictive or less addictive.	Yes (26)	- Effect on notable reduction in cigarette smoking, smoking prevalence and related harm. - Public support for VLNC standard. - Impact on the use of other nicotine products or drugs. - Impact on people experiencing mental illness, socio-economic disadvantage, pregnancy.	- Feasibility. - Impact of the policy in terms of mental and physical health outcomes, use of alternative nicotine products, other substance use, and priority populations. - Tobacco industry responses. - Potential effect on the illicit market. - Impact of public communication and education strategies to maximise policy benefits. - Nicotine threshold for addiction.

Policy category	Policy description	Sufficient literaturea (n studies in Puljević et al.[6])	Main evidence	Main evidence gaps
	2. Set product standards for nicotine products that make combustible tobacco products unappealing or removed from the market for exceeding toxicity thresholds.	No (1)	- Evidence on public support for the policy for banning menthol.	- Feasibility. - Tobacco industry responses, e.g. substituting banned constituents with other harmful ingredients.
User-focused	3. Require consumers to obtain a purchaser's licence or medical prescription to purchase tobacco.	No (0)		
	4. Restrict tobacco sales by year born (tobacco-free generation).	No (4)	- Modelling population health impact of tobacco-free generation. - Key legal and ethical issues of the tobacco-free generation. - The implementation of this policy alone in a simulation model is unlikely to achieve a 5% smoking prevalence in 10 years. - If combined with policies of denicotinization and retail outlet reduction, this policy could have major impacts on reducing inequities in health. - Indirect evidence on youth defiance; universal laws may be better perceived by adolescents; age-specific laws are perceived as a form of youth control.	- Policy effectiveness - Exact meaning of human rights articles within the sphere of public health.
Market/ supply-focused	5. End commercial retail sale of combustible tobacco (abolition).	No (2)	- Variable public support (12%-88%).	- Empirical evidence on effectiveness in achieving tobacco endgame.
	6. Set a regularly reducing quota on the volume of tobacco products manufactured or imported into a country ('sinking lid').	No (2)	- Simulation of implementation in New Zealand. - Simulated impact on health gain and cost saving.	- Policy effectiveness, practicality or legality. - Substitution relationships between different tobacco products.
	7. Actions that reduce the commercial viability of tobacco companies, such as a 'corporate death penalty', or criminal charges, requiring compensation for full impacts of tobacco use, or limiting profitability.	No (0)		

Policy category	Policy description	Sufficient literaturea (n studies in Puljević et al.[6])	Main evidence	Main evidence gaps
	8. Increases in tobacco tax that make tobacco products generally unaffordable.	Yes (7)	- Effect on health improvement and on decrease of smoking prevalence. - Decreased health system costs.	- Country-specific research on price elasticity variation by age and social groups. - Impact of tax increase in conjunction with other policies.
	9. Restrictions on tobacco retailer density/ location/type/licensing that substantially reduce tobacco availability.	Yes (10)	- Effective for reducing population-level tobacco use and health system costs.	- Feasibility in some European countries, e.g. France, Italy and Spain, where tobacconists are exclusive tobacco retailers.
Institutional structure-focused	10. Transfer management of tobacco supply to an agency with a mandate to phase out tobacco sales.	No (0)		
	11. Performance-based regulation whereby tobacco companies are required to meet smoking prevalence targets or be fined; or manufacturers pay a levy based on sales volume similar to 'polluter pays' schemes.	No (0)		

a Sufficient studies: n>5.

The tobacco endgame policy which collected the most evidence was the product-focused policy on mandatory very low nicotine content (VLNC) standard with 26 studies that addressed various aspects of the topic (policy 1, Table 1). The main goal of the policy is to create less addictive products with the aim of reducing tobacco use. Although a VLNC standard is yet to be implemented in any country, the New Zealand government announced in 2021 that it will implement such a measure by 2025 (yet this and other tobacco endgame measures have been since repealed when the government changed) and the US FDA has also proposed such a measure. Despite VLNC is the most studied policy, it still has several evidence gaps. First, the feasibility of VLNC is unknown. Moreover, there is no evidence of its potential effects in terms of mental and physical health outcomes, possible transition to other tobacco or nicotine products or other substance use, and priority populations. Then, industry as well as illicit market responses are unknown. Finally, the threshold for developing dependence is currently unknown[6].

Another product-focused policy is setting product standards that would make combustible tobacco products unappealing, such as raising pH of cigarettes or banning menthol(policy 2, Table 1). This policy was studied in a narrative review which presented various proposals to redesign cigarettes but reported evidence only on public support for the policy for banning menthol[1].

Less evidence was identified for market-/supply-focused policies. Increasing tobacco taxes making tobacco products generally unaffordable (policy 8, Table 1) was analysed in seven studies. The policy was proven to significantly reduce smoking. The main gap that makes this policy unfeasible is that increases in tax levels necessary to achieve endgame goals could be politically difficult to implement in a short time frame. However, Australia Government succeeded in increasing tobacco price from around 4 euros per 20 cigarette package in 2001 to around 24 euros in 2021[8]. Ending sales of tobacco products (implemented in two local USA government areas) was analysed in two studies

which presented large gaps in its effectiveness on achieving endgame goals and with no feasibility studies conducted (policy 5, Table 1). Also, the so-called "sinking-lid" policy, i.e., setting a regularly reducing quota on the volume of tobacco products manufactured or imported into a country (policy 6, Table 1), was analysed in two simulation studies that explored its practical implementation in New Zealand and simulated gains in health and cost savings[10, 11].

Ten studies considered a policy of restricting tobacco retailing as part of an endgame strategy, with the aim to reduce both adolescent and adult smoking rates (policy 9, Table 1). This policy was implemented in Hungary where the number of tobacco selling shops reduced from nearly forty thousand to a few thousand, and set as a government policy goal in New Zealand and Australia. However, there might be significant differences between countries in Europe, as for example in Italy, France and Spain, selling tobacco is allowed only for tobacco-specific retailers, and opposition from the retail sector will not be negligible when adapting such a policy[12, 13].

No evidence was found for several policy categories: the user-focused policy on requiring consumers to obtain a purchaser's licence or medical prescription to purchase tobacco (policy 3, Table 1), the supply-focused policy on actions that reduce the commercial viability of tobacco companies (policy 7, Table 1), the institutional structured-focused policies on transferring management of tobacco supply to an agency with a mandate to phase out tobacco sales (policy 10, Table 1). Similarly, no evidence was found on performance-based regulation whereby tobacco companies are required to work for reducing smoking prevalence (policy 11, Table 1).

Finally, the user-focused policy for tobacco-free generation (policy 4, Table 1) was considered in four studies reporting substantial population-level health improvements, even if the potential of achieving the endgame goal of minimal smoking prevalence is not necessarily achieved if implemented alone. A recent simulation study in New Zealand considered a combined package of denicotinization of retail tobacco, 95% reduction in retail outlets and tobacco free-generation. The authors estimated it was associated with a large smoking prevalence reduction[14]. The policy was implemented in Balanga City Council (Philippines) from 2016 by banning the sale and use of all tobacco products for those born on or after January 1, 2000, thereby becoming the first in the world to embody the tobacco-free generation idea[15]. Moreover, the policy was adopted in Brookline City Council (USA) in 2021 using again the 2000 cut-off[16] and also recently in New Zealand using 2009 as cut-off date[17]. Moreover, an unsuccessful attempt of implementation was carried out in Australia, in the state of Tasmania[18], where the policy was introduced into parliament but it lapsed when parliament was prorogued in 2018, despite the public support towards this proposed legislation being quite high (75% among Tasmanian adults and 72% among current smokers)[19]. A European Citizens' Initiative was presented in August 2022 to achieve a tobacco-free environment and the first European tobacco-free generation by 2030, by advocating for ending the sale of tobacco and nicotine products to citizens born after 2010[20].

An update of review on the policy regarding tobacco-free generation

Given the recent initiatives and their feasibility as demonstrated by policy implementations, an update of scientific reviews specific to the tobacco-free generation policy was carried out. The Pubmed literature search resulted in nine papers, two of which were already included in the 2022 scoping review[6], and five that did not include substantive evidence synthesis[21-25]. Two studies thus resulted from the update[14, 26].

Berrick[26] collected indirect evidence on the relevance and implications of adolescent psychology for minimum-age laws. This report highlighted the uncertain efficacy of age-restrictive tobacco laws in reducing adolescent smoking prevalence, recalling a recent review that noted the absence of studies evaluating the effects of an age-of-sale ban as distinct from other policies enacted simultaneously[27]. Moreover, uncertainty around minimum-age laws was also due to the fact that they are advocated by tobacco industries that are well aware of adolescent psychology and of their

reaction to age-restricted laws. This is exemplified by three aspects. First, being the tobacco use is legal and thus safe for adults, then presumably the real aim of the law could be considered as youth control rather than tobacco control. Second, reactance theory predicts that youth legally excluded from the product will find it more desirable. Finally, in the presence of under-age laws, cigarettes become a symbol of the onset of maturity. Another aspect of indirect evidence about adolescent reactions to age-restrictive laws collected by Berrick and Gkritza[28] was given for laws concerning motorcycle helmets, with youth defiance of an age-restricted helmet law that disappeared when replaced by a universal law. This supports studies of youths' reactions that highlight that universal laws may be perceived by adolescents intended for protective benefit, whereas age-specific laws as signalling authorities' desire for youth control. However, raising the age of sale to 21 years seems to have a positive impact on reducing smoking[29-31]. Tobacco 21 laws reduced smoking rates of youths aged 18-20 years by 2.5 to 4 percentage points[32].

The second study resulting from the review update is a simulation model with a hypothesized effect of reducing smoking initiation by 90% in 10 years from the implementation of the tobacco-free generation in 2022 in New Zealand[14]. The study showed that a <5% smoking prevalence will not be achieved in 2040 by sex and ethnic group. If combined with VLNC policies and retail outlet reduction, the tobacco-free generation policy would achieve a rapid reduction in smoking prevalence, mainly due to VLNC, and would reduce health inequity between Māori and non-Māori[14].

Finally, studies resulting from the review update did not report evidence to support the law for reasons related to adolescent psychology and the limited effectiveness of the law in reducing prevalence if implemented alone.

Research needs

Further research is needed to improve estimates of the effectiveness of endgame policies that is small or poor for most interventions due to the lack of implementation. Quantitative examination of examples of implementation (even partial) would be useful[6]. Moreover, further studies are needed to evaluate the impact of endgame policies in priority populations and in low-income countries. These populations have notably high levels of smoking prevalence being in a previous stage of the tobacco epidemic compared to non-priority or high-income populations. There is little research on the feasibility and effectiveness of implementing endgame strategies at an early stage of the tobacco epidemic[6].

RQ 2a. National tobacco endgame definitions

There were different kinds of definitions of the selected endgame goals. Most of the countries had defined it by prevalence of tobacco (or tobacco and nicotine) product use (Table 2). Other definitions were related to tobacco-free generation/society. Some of the countries incorporated both prevalence and tobacco-free generation/society definitions in their endgame objective (the Netherlands, Norway, England). Most of the countries included combustible tobacco in their endgame goals while some countries, such as Finland, Norway and Slovenia, included also other tobacco or nicotine products (excluding nicotine replacement therapy), such as electronic cigarettes, in their endgame goals.

Table 2. Definitions of the current endgame goals of the European endgame countries.

Country	Definition	Year launched	Endgame goal, year
Belgium	< 5% population aged 15+ use tobacco daily by 2040	2022	2040
Finland	Nicotine free Finland by 2030 • end the use of tobacco and other nicotine-containing products by 2030 • < 5% of the adult population use tobacco and nicotine products daily	2016 (first in 2010)	2030 (first by 2040)

Country	Definition	Year launched	Endgame goal, year
France	Children born since 2014 become the first non-smoking generation of adults by 2032 • A generation in which 95% of people do not smoke (less than 5% smokers)	2018	2032
Ireland	Tobacco Free Ireland by 2025 • < 5 % smoking prevalence rate of the Irish population	2013	2025
Netherlands	In 2040 • <5% of the residents of the Netherlands aged 18 years and over will smoke • 0% of young people (smoke-free generation) and pregnant women will smoke	2019	2040
Norway	Tobacco-free generation 2010. Children born in 2010 and later will not use tobacco and nicotine products • The proportion of daily smokers and daily users of snus must be under 5%	2023 (first in 2013)	Not defined
Slovenia	Tobacco free society by 2040 • < 5% of the population aged 15+ use tobacco and other nicotine-containing products	2022	2040
Sweden	< 5% smoking prevalence by 2025	2016	2025
United Kingdom	England smoke free by 2030 • ≤ 5% smoking rate • a smokefree generation	2019	2030
	Scotland • ≤ 5% smoking prevalence of adults by 2034 • a tobacco-free generation (children born in 2013 by the age of 21)	2013	2034

RQ 2b: Have tobacco endgame measures been included in the strategies? Has support for tobacco cessation been integrated to strategies?

Tobacco endgame measures

All of the countries included some product standards in their endgame measures, which were commonly based on EU TPD regulations and mainly referred to bans on characterising flavours and additives. Some countries (Belgium, Finland, Norway and Slovenia) extended flavour bans also to other products than cigarettes and roll-your-own tobacco (regulated by the EU TPD). Plain packaging was adopted in all the countries except in Sweden. Norway included warnings on individual cigarette sticks and Scotland included pack inserts in their strategies. France was the only country which acknowledged the reduction of nicotine levels in cigarettes. England and Scotland included the possibility to restrict the tobacco sales by year born in their strategies yet none of the countries included licence or prescription to purchase cigarettes in the strategies. Considering institutional structure-focused measures, none of the countries included transferring management of tobacco supply to an agency or required tobacco companies to meet smoking prevalence targets defined by the governmental tobacco control policy.

Market/supply-focused measures were infrequently included in the strategies. None of the country strategies included measures to increase the taxes to make tobacco products generally unaffordable (although conventional tax increases were commonly included), to end commercial retail sale of combustible tobacco, to reduce quota of tobacco products manufactured or imported into the country or to reduce commercial viability of tobacco companies. Strategies of all the 10 countries included measures to reduce tobacco availability for example by licencing or registry systems and banning sales in certain places (near schools, festivals, hospitals, etc.) or banning distance sales. For example, in the Netherlands, tobacco sales are going to be restricted gradually only to tobacco shops, what is already in place in France.

Integration of tobacco cessation support

All the countries included a number of different smoking cessation support measures in their strategies. Cessation support measures included, for example, increasing and developing the services, increasing the availability and affordability of cessation medicines (for example in France by reimbursing nicotine replacement therapy), and preparation (Ireland, Slovenia) or enhancing the implementation (Finland) of national care guidelines. Even though cessation measures were given strong emphasis in all the countries' strategies, none of the countries linked these cessation measures to specific endgame measures.

RQ 2c: Have vulnerable population groups been considered in the development, implementation, and evaluation of tobacco endgame goal?

All the included countries at least mentioned vulnerable groups in their strategies, usually children, pregnant women, people experiencing mental illness and smokers with low socioeconomic position (Table 3). This was especially emphasized in Sweden, which also was, in addition to England, the only country considering people according to sexual orientation in their strategies. Even though the mentions of vulnerable groups were common, only a few countries planned measures outside smoking cessation support measures to reduce tobacco use especially among these groups. In Scotland and France, there are explicit objectives for prevalence reduction of smoking in groups with low socio-economic position. In Belgium, mentions about vulnerable groups concentrated on measures of smoking cessation in different settings, such as health care and social care, educational institutions/schools, and workplaces. In Sweden, supervision of tobacco and nicotine products and prevention work in schools were emphasized.

Table 3. Included vulnerable groups and related actions in the current strategies among European tobacco endgame countries.

Country	Vulnerable population groups are included in the strategy	Examples of actions on vulnerable groups (either general or specific groups)
Belgium	Minors, social groups consuming more tobacco, patients with psychiatric disorders	General: close co-operation with health care and social care to ensure proximity to the most vulnerable groups, educational support in quitting assistance in different sites (school, work, healthcare, local government, leisure); Multicultural origin: setting up smoking cessation centres in hospitals and strengthening the link between tobacco specialist and hospitals. Youth: smoke-free environments
Finland	Youth, pregnancy, mental health patients, low socio-economic position, unemployed	General: supporting smoking cessation in groups where smoking is common Youth: raising minimum age, sport club tobacco and nicotine use prevention, tobacco-free playgrounds and beaches
France	Children/youth, pregnancy, low socio-economic position, low income, unemployment, incarcerated people, mental health patients	General: strengthen the support for smoking cessation, strengthen the accessibility of nicotine replacement therapies; "Tobacco-free Healthcare Facilities" including mental health facilities and maternity wards, smoke-free environments for incarcerated people Children: reduce the attractiveness and availability of tobacco and nicotine products, facilitate support for smoking cessation (especially in vocational schools), promote non-smoking areas around entrance areas of educational establishments
Ireland	Children, young adults, retired, low socio-economic position, pregnancy	General: smoking cessation staff trained to deal with specific groups Children: smoke-free environment (schools, child care), prohibit sale in events for <18yrs, campaigns
Netherlands	Children/youth, pregnancy, low socio-economic position	Children: smoke-free environment (schools, zoos, sports clubs); Pregnancy: smoke-free-pregnancy campaign, cessation training courses

Country	Vulnerable population groups are included in the strategy	Examples of actions on vulnerable groups (either general or specific groups)
Norway	Children/youth, pregnancy, immigrant groups, low socio-economic position	General: National tobacco cessation program to reduce inequalities in health
Slovenia	Children/youth, pregnancy, hospitalized/ mental health patients, low socio-economic position	General: equal access to programs on prevention of initiation and cessation regardless of age, gender and socio-economic position, education and geography, campaigns on smoking cessation aimed at vulnerable groups, extension of smoke/aerosol-free places Children: school programs;
Sweden	Children, socio-economic groups, ethnic background, age, gender, sexual orientation	Minors: supervision of tobacco and nicotine products, prevention work in schools
UK: England	Youth, pregnancy, mental health, low socio-economic position (income, occupation), ethnicity, incarcerated people	Young people: Prohibiting selling tobacco products for anyone born on or after 1 January 2009, restricting the flavours and description and the sale of of vapes, point-of-sale display regulation for vapes, regulating vape packaging Pregnancy: brochures and behavioural support for pregnant smokers to stop smoking, guidance on how to help quit, CO testing; Mental health: materials for staff, gather evidence how to reduce prevalence and integrate services
UK: Scotland	Young people, pregnancy, low socio-economic position, incarcerated people, mental health patients	Young people: raising the age of sale, marketing campaigns; Prison: integrated smoking cessation services Pregnancy: support for smoking cessation

RQ 2d: Is the progress towards the endgame goal being evaluated?

All the countries had some plans to evaluate the progress towards the endgame goal. However, the level of details in the description of the evaluation plan differed. For some countries, holistic elements of the evaluation of public health policies were discussed (Norway) whereas other countries had a more detailed monitoring and evaluation plan (Scotland). Other countries, such as Finland and Sweden, described regular assessments of the effects of the measures yet with less details.

RQ 2e: Are the countries progressing towards the endgame goal with the selected measures?

According to WHO, regular daily smoking rates differed between countries from 24% (France) to 7% (Norway) (Table 4, Panel C). It was estimated that the prevalence of current tobacco use will decrease from 2022 to 2025 in all the countries (Table 4, Panel A vs Panel B). For most of the included countries, the decline in tobacco use prevalence from 2022 to 2025 is estimated to be about 1-3 percentage points, implying challenges in meeting the selected endgame goal of smoking/ tobacco use prevalence of less than/less than or equal to 5%. Overall, based on the WHO tobacco use prevalence data, it seems that current progress is not sufficient for countries to reach their endgame goals.

E-cigarette use and smokeless tobacco use differed between countries (Table 4, Panel D, Panel E). E-cigarette use was most prevalent in the UK, Belgium, France and Ireland while smokeless tobacco use was the most prevalent in Norway and Sweden.

Table 4. Prevalence (%) of tobacco, smokeless tobacco and e-cigarette use in European endgame countries.

	Panel A[a]	Panel B[a]	Panel C[b]	Panel D[c]	Panel E[c]
Country	**Current tobacco use prevalence 2022, ≥15yrs (%)**	**Current tobacco use prevalence estimate to 2025, ≥15yrs (%)**	**Regular daily smokers in population ≥15yrs (year: %)**	**Current e-cigarette use, year, (%, age group)**	**Current smokeless tobacco use, year (%, age group)**
Belgium	24.7	22.3	2018: 15.4	2021: 10.0, ≥15y	n/a
Finland	19.6	16.6	2020: 12.0	2021–2021: 2.0, ≥20y	2020–2021: 7.0, ≥20y
France	29.2	28.9	2019: 24.0	2021: 6.7, 18–75y	n/a
Ireland	18.2	16.8	2022: 18.0	2022: 6.0, ≥15y	n/a
Netherlands	20.1	18.7	2021: 14.7	2020: 1.0, ≥15y	n/a
Norway	14.0	12.0	2022: 7.0	n/a	2022: 18.0, 16-74y
Slovenia	18.1	17.3	2019: 17.4	2021: 1.3, ≥18y	2021: 1.3, ≥18y
Sweden	22.1	20.1d	2021: 9.7	2022: 2.0, 16-84y	2022: 14.0, 16-84y
United Kingdome	13.1	11.5	2021:14.5	2021: 7.7, ≥16y	n/a

n/a: Data not available
a Reference: WHO 2024. WHO global report on trends in prevalence of tobacco use 2000–2030. Geneva: World Health Organization; 2024. Licence: CC BY-NC-SA 3.0 IGO Available from: https://www.who.int/publications/i/item/9789240088283 (accessed 31 January 2024)
b Reference: WHO European Region 2022. European Health Information Gateway. % of regular daily smokers in the population, age 15+. Available from: https://gateway.euro.who.int/en/indicators/hfa_421-3010-of-regular-daily-smokers-in-the-population-age-15plus/ (accessed 1 February 2024)
c Reference: WHO 2023. The Global Health Observatory. Most recent nationally representative survey reporting prevalence of current smokeless tobacco use or current e-cigarette use among adults (Tobacco control: Monitor). Available from: https://www.who.int/data/gho/data/indicators/indicator-details/GHO/gho-tobacco-control-monitor-survey-reporting-prevalence-of-smokeless-tobacco-use-or-e-cigarette-use-among-adults (accessed 1 February 2024)
d The estimates for the year 2025 for Finland (13.8%) Sweden (10.8%) in the WHO (2024) report seems incorrect based on the observed prevalence for 2022 in Panel A and in the earlier WHO (2021) report. Thus, estimates for Finland and Sweden taken from the this earlier report: WHO global report on trends in prevalence of tobacco use 2000-2025, fourth edition. Geneva: World Health Organization; 2021. Licence: CC BY-NC-SA 3.0 IGO. Available from: https://www.who.int/publications-detail-redirect/9789240039322 (accessed 1 February 2024)..
e Data from Scotland and England are unavailable in the WHO databases, so prevalence is presented for UK as global

Discussion

In this article, we reviewed the current knowledge on the effectiveness of proposed tobacco endgame measures and identified future research needs. We also examined how has the endgame goal been operationalized in the national strategies among European countries with official tobacco endgame goals.

Existing scientific reviews highlighted sufficient evidence (over 5 studies) on tobacco endgame policies of VLNC, increases in tobacco tax that make tobacco products generally unaffordable, and restrictions on tobacco retailers. An update of the literature was carried out for the tobacco-free generation policy, which then reached sufficient evidence that was set as more than 5 studies on the topic.

The VLNC policy was the most studied tobacco endgame policy, however research is needed to estimate its feasibility, its potential effects on the use of other tobacco products and in terms of mental and physical health, responses of the tobacco industry and illicit market to this policy measure as well as the adequate nicotine threshold of the products to alleviate nicotine craving. The increase in tobacco taxes and the restriction of tobacco retailers resulted in effectively reducing smoking prevalence, however there are evidence gaps in price elasticity and feasibility of tobacco retailer restrictions in some European countries.

Evidence on the tobacco-free generation policy reported population-level improvements but also uncertainty as to whether the objective of the targeted maximum smoking prevalence can be achieved, especially for adolescents due to their reactions to age-restrictive laws. In addition to the literature review, recent studies in USA demonstrate that Tobacco 21 laws have positive results regarding the reduction of smoking in young adults and adolescents[32, 33]. However, the majority of these policies were not yet implemented, or their impact not assessed in the European countries with an adopted endgame strategy. The final result is a lack of evidence of their wanted and unwanted impacts on this target population. Further research is needed to improve estimates of the effectiveness of endgame policies. Furthermore, studies are needed to evaluate the impact of endgame policies, not only in European populations, but also in populations in an early stage of the tobacco epidemic.

There remains large uncertainty on the feasibility of tobacco endgame measures. There are also differences in what measures are being considered as tobacco endgame measures in relation to new tobacco and nicotine products. For example, McDaniel et al. review[1] concluded that "a full consideration of the implications of e-cigarettes for endgame purposes is beyond the scope of this review", justifying it with the challenge of assessing their role in different endgame scenarios. This is due to the controversy over these products' marketing and use, lack of long-term research on their health effects, variability among the products themselves, rapid changes and development of these products, and the political dynamics of rapid acquisition of e-cigarette companies and products by cigarette companies. On the other hand, Puljević et al.[6] presented "moving consumers to reduced risk products" as one endgame policy with multiple evidence syntheses (8 studies on the topic). There is no widely accepted definition of harm reduction yet in the endgame approach where the aim is to minimize the overall health harms, the harm reduction approach should reduce the risks for all the different population groups, not only for individuals in some groups (e.g. smokers)[35-37]. The actual effects of a shift from conventional cigarettes to alternative nicotine products is usually guided by behavioural tendencies that are difficult to control only with policy interventions[38]. As an example, in Italy, despite the sudden increase in novel tobacco products after their introduction, the majority of smokers were still loyal to conventional cigarettes, and more than half of novel product users kept on smoking conventional cigarettes[38]. Similar results have been found elsewhere[40]. In WP9 of the JATC2-project, harm reduction policies have not been considered as tobacco endgame measures but possible supplementary measures to those.

Ten European countries were identified as having an official endgame goal: Belgium, Finland, France, Ireland, Netherlands, Norway, Slovenia, Sweden, England, and Scotland. Most of them had defined the goal by a specific prevalence of tobacco product use and/or objectives related to a tobacco-free generation/society. Prevalence-related measures all defined the objective of a use level of 5% or less. Also, in non-European countries with an endgame goal, such as New Zealand, the objectives related to these two measures. Similarly, one of the objectives of the European Beating Cancer Plan ("Tobacco-free Generation" with a prevalence of 5% or less in 2040) is in line with these objectives[2]. In some countries, the objective included, in addition to combustible tobacco use, also nicotine use. Considering the extensiveness of the endgame approach in the EU, it must be noted that these 10 countries are a minority and most of the EU countries have yet to set such a goal overall. In this light, the included countries could be seen in the forefront in tobacco control where the aim is ending the tobacco epidemic instead of reducing and controlling it[1].

According to the assessment of the national endgame policy documents, all included countries were rather similar considering the adopted measures. For example, all countries had adopted some product standards in their endgame measures, mainly bans on flavour additives and tax increases. Still, adopted tax increases were modest in terms of a definition of an endgame measure that would be to increase them to make tobacco products generally unaffordable. Strategies to reduce tobacco availability, for example by licencing systems and/or banning sales in some places, were adopted in all included countries. Examples of banning sales in certain places, such as in supermarkets and in gas stations like in the Netherlands and in France, would give valuable information on possible challenges for other countries to acknowledge when planning to implement such a measure. Notably,

the measure with the most studies on, VLNC, was acknowledged only in France among the European endgame countries.

Overall, important evidence gaps remain on the feasibility of different endgame measures for European countries. Most of the prior evidence comes from other countries, such as the USA, and more research on the possible effects in European countries is warranted. It must be noted that part of the adaptation of regulations is based on the implementation of the EU TPD. It seems TPD is successful in setting some standards on regulations for the member states such as those relating to product standards (for example, menthol ban). However, presently, TPD is less capable of supporting countries adopting and implementing more advanced measures than required by the directive. The procedure of notification to the Commission about national measures is one example that might hinder the adaptation of advanced endgame measures at the national level.

All the reviewed national policy documents related to tobacco endgame included some mentions of vulnerable groups. These mentions were related to smoking cessation as well as to other measures. Vulnerable groups identified most commonly were adolescents but also pregnant women, persons with low socioeconomic position and persons with mental health problems. Certain vulnerable groups were however neglected by most documents (e.g., LGBTQ+). Disappointedly, practical actions related to vulnerable groups were uncommon as only a few countries planned measures to reduce tobacco use especially among discussed vulnerable groups. Pro-equity measures should be emphasized when planning, adopting, and implementing future tobacco control measures to account for different population groups and especially those most vulnerable. Smoking cessation measures were given strong emphasis in country strategies but incorporating cessation measures in specific endgame measures was lacking. These measures could be linked to, for example, VLNC and high tax increases. In general, cessation support is one of the domains where European countries need to improve the implementation of measures laid down in Article 14 of the WHO FCTC[41].

Countries had different plans for evaluating the progress toward the endgame objective. Some countries had a comprehensive evaluation plan, such as Scotland, while some reported more general activities. Based on WHO prevalence estimates, the current progress in decreasing tobacco use is not sufficient for countries to reach their endgame goals, and especially for countries with earlier endgame goals (e.g., in 2025 in Ireland). More comprehensive measures should be adopted and implemented also for other countries to meet the objectives based on the historical trends of use. Furthermore, publishing estimates of the future prevalence of different tobacco and nicotine product use by the WHO would be beneficial for countries incorporating them into their endgame goals.

Our investigation concentrated on European countries with a national endgame goal. Mentions of different policy measures in each country's policy document(s) should be viewed carefully in terms of actual changes in legislation; the policies in the documents do not guarantee further enactment and implementation of the measures. Some of the measures in the strategies have been implemented, such as plain packaging in Finland, France and the Netherlands, and bans on characterising flavours in several countries as well. Nevertheless, our review gives a description of the European endgame countries and their adopted strategies at one study point, providing comprehensive information for cross-country comparisons and further developing and assessing the tobacco endgame situation in Europe.

There are also many countries that have adopted different tobacco control measures but do not have an official endgame objective, such as Iceland, Hungary, and Ukraine. NGOs in different countries, such as Greece, Germany, Romania, and Spain, have adopted endgame goals, but they are not objectives of the government[42]. Supporting these and other countries that have not presented endgame goals yet, to adopt a national endgame objective would provide synergies for European countries in preventing tobacco use and accomplishing national and international tobacco endgame aims.

Conclusions

This review showed that there are ten European countries that have adopted an official endgame goal, which usually considers a prevalence objective of use of no more than 5% by a certain year. Based on the current prevalence estimates of tobacco use, achieving the goals will be challenging unless more emphasis and specific measures are implemented to curb tobacco and nicotine product use. It is also worth noting that in some of the countries with the endgame goals, WHO FCTC and MPOWER measures have not yet been adopted fully, that also can be seen as a barrier for achieving the goals. In addition to implementing these measures, new innovative strategies and measures to target the objective of an endgame would also be essential. The current evidence on these strategies and measures is still limited and further studies are necessary, but their positive impact has been suggested.

References

1. McDaniel PA, Smith EA, Malone RE. The tobacco endgame: a qualitative review and synthesis. Tob Control. 2016;25(5):594-604. doi:10.1136/tobaccocontrol-2015-052356
2. European Commission. Europe's Beating Cancer Plan Communication from the commission to the European Parliament and the Council. European Commission; 2022. Accessed 23 May 2023: https://health.ec.europa.eu/system/files/2022-02/eu_cancer-plan_en_0.pdf
3. European Commission. Attitudes of Europeans towards tobacco and electronic cigarettes. Special Eurobarometer 506. European Commission; 2021. Accessed 12 January 2024: https://europa.eu/eurobarometer/surveys/detail/2240
4. European Commission. Europe's Beating Cancer Plan: Commission publishes implementation roadmap. European Commission; 2021. Accessed 22 May 2023: https://ec.europa.eu/newsroom/sante/items/727246/en
5. Edwards R, Hoek J, Karreman N, et al.. Evaluating tobacco industry 'transformation': a proposed rubric and analysis. Tob Control. 2022;31(2):313–321. doi:10.1136/tobaccocontrol-2021-056687
6. Puljević C, Morphett K, Hefler M, et al. Closing the gaps in tobacco endgame evidence: a scoping review. Tobacco Control. 2022;31(2):365-375. doi:10.1136/tobaccocontrol-2021-056579
7. JATC2 WP9 partners. M9.1 Indicator compendium - WP9 "Best practices to develop an effective and comprehensive tobacco endgame strategy." Joint Action on Tobacco Control 2. Outcomes and useful material. 2023. www.jaotc.eu
8. Scollo, M, and Bayly, M. 13.3 The price of tobacco products in Australia. In Greenhalgh, EM, Scollo, MM and Winstanley, MH [editors]. Tobacco in Australia: Facts and issues. Melbourne: Cancer Council Victoria; 2023. Available at: http://www.tobaccoinaustralia.org.au/chapter-13-taxation/13-3-the-price-of-tobacco-products-in-australia (accessed 1 February 2024)
9. Cornell University Library. A guide to evidence synthesis: types of evidence synthesis. Ithaca, NY: Cornell University Library, 2021.
10. Tait P Saunders C Rutherford P Tobacco Control Research Tūranga Lincoln University (Canterbury N.Z.). Agribusiness and Economics Research Unit. Quota Management Policy for New Zealand Tobacco Supply. Auckland N.Z: Tobacco Control Research Turanga School of Population Health University of Auckland; 2013. Accessed January 12 2024: http://www.turanga.org.nz/sites/turanga.org.nz/files/Quota Policy Report online.pdf.
11. van der Deen FS, Wilson N, Cleghorn CL, et al. Impact of five tobacco endgame strategies on future smoking prevalence, population health and health system costs: two modelling studies to inform the tobacco endgame. Tob Control. 2018;27(3):278-286. doi:10.1136/tobaccocontrol-2016-053585
12. McNeill A, Guignard R, Beck F, et al. Understanding increases in smoking prevalence: case study from France in comparison with England 2000-2010. Addiction 2015110(3):392-400. doi:10.1111/add.12789
13. Tiessen J, Hunt P, Celia C, et al. Assessing the impacts of Revising the Tobacco Products Directive. Study to support a DG SANCO Impact Assessment. RAND Corporation, 2011. Accessed 15 August 2023: https://www.rand.org/pubs/technical_reports/TR823.html
14. Ait Ouakrim D, Wilson T, Waa A, et al. Tobacco endgame intervention impacts on health gains and Māori:non-Māori health inequity: a simulation study of the Aotearoa/New Zealand Tobacco Action Plan. Tob Control Published Online First: 10 January 2023. doi: 10.1136/tc-2022-057655
15. de Leon K, Sarita JT. The Philippines: pioneering the tobacco endgame. Tob Control. 2020. Accessed 8 January 2024: https://blogs.bmj.com/tc/2020/01/13/the-philippines-pioneering-the-tobacco-endgame/

16. Berrick J. Worldwide news and comment: US: Brookline introduces Tobacco-Free Generation law. Tobacco Control 2022;31:399-401. doi:10.1136/tobaccocontrol-2022-057419
17. Dyer O. New Zealand plans to outlaw tobacco sales to citizens born after 2008. BMJ. 2021; 375:n3057. doi:10.1136/bmj.n3057
18. Walters EH, Barnsley K. Tobacco-free generation legislation. Med J Aust. 2015;202(10):509510. doi:10.5694/mja15.00416
19. Trainer E, Gall S, Smith A, et al. Public perceptions of the tobacco-free generation in Tasmania: adults and adolescents. Tob Control. 2017;26(4):458-460. doi:10.1136/tobaccocontrol-2016-053105
20. Fernández Megina R, Radu-Loghin C, Rodriguez Lozano F. European Citizens' Initiative "Call to achieve a tobacco-free environment and the first European Tobacco-Free Generation by 2030". Tob Prev Cessation. 2023;9(Supplement):A121. doi:10.18332/tpc/162826
21. Linnansaari A, Ollila H, Pisinger C, et al. Towards Tobacco-Free Generation: implementation of preventive tobacco policies in the Nordic countries. Scand J Public Health. 2023;51(8):1108-1121. doi:14034948221106867 doi:10.1177/14034948221106867
22. Willemsen MC, Been JV. Accelerating tobacco control at the national level with the Smoke-free Generation movement in the Netherlands. NPJ Prim Care Respir Med. 2022;32(1):58. doi:10.1038/s41533-022-00321-8
23. Been JV, Laverty AA, Tsampi A, et al. European progress in working towards a tobacco-free generation. Eur J Pediatr. 2021;180(12):3423-3431. doi: 10.1007/s00431-021-04116-w
24. Hefler M, Bianco E, Bradbrook S, et al. What facilitates policy audacity in tobacco control? An analysis of approaches and supportive factors for innovation in seven countries. Tob Control. 2022;31(2):328-334. doi: 10.1136/tobaccocontrol-2021-056570
25. Johannesen CK, Andersen S, Bast LS. Estimating future smoking in Danish youth - effects of three prevention strategies. Scand J Public Health. 2021;49(8):931-939. doi:10.1177/1403494820942678
26. Berrick J. Drawing on Adolescent psychology to achieve tobacco-free generations. Public Health Rev. 2022;43:1604321. doi:10.3389/phrs.2022.1604321
27. Nuyts PAW, Kuijpers TG, Willemsen MC, et al. How can a ban on tobacco sales to minors be effective in changing smoking behaviour among youth? A realist review. Prev Med. 2018;115:61-67. doi:10.1016/j.ypmed.2018.08.013
28. Berrick J, Gkritza K. Adolescent noncompliance with age-specific versus universal US motorcycle helmet laws: systematic review and meta-analysis. J Saf Res. 2021;76:166–75. doi:10.1016/j.jsr.2020.12.011
29. Friedman AS, Buckell J, Sindelar JL. Tobacco-21 laws and young adult smoking: quasi-experimental evidence. Addiction. 2019;114(10):1816-1823. doi:10.1111/add.14653
30. Friedman AS, Wu RJ, Do local tobacco-21 laws reduce smoking among 18 to 20 year-olds?, Nicotine Tob Res. 2020;22(7):1195-1201.doi:10.1093/ntr/ntz123
31. Nuyts PAW, Kuipers MAG, Willemsen MC, et al. An increase in the tobacco age-of-sale to 21: for debate in Europe. Nicotine Tob Res. 2020;22(7):1247-1249. doi:10.1093/ntr/ntz135
32. Bryan C, Hansen B, McNichols D, et al. Do state Tobacco 21 Laws work? NBER Working Paper Series, Working paper 28173. National Bureau of Economic Research, 2021. Accessed 8 January 2024: https://www.nber.org/system/files/working_papers/w28173/w28173.pdf
33. Colston DC, Xie Y, Thrasher JF, et al. Tobacco 21 laws may reduce smoking and tobacco-related health disparities among youth in the U.S. Prev Med Rep. 2022;27:101762. doi:10.1016/j.pmedr.2022.101762
34. Morain SR, Garson A, Raphael JL. State-level support for tobacco 21 laws: results of a Five-State Survey. Nicotine Tob Res. 2018;20(11):1407-1411. doi:10.1093/ntr/ntx208
35. Marlatt GA. Harm reduction: come as you are. Addict Behav. 1996;21(6):779-788. doi:10.1016/0306-4603(96)00042-1
36. Beirness DJ, Jesseman R, Notarandrea R, et al. Harm reduction: what's in a name? Canadian Centre on Substance Use and Addiction, Ottawa, CCSA, May 2008. Accessed 8 January 2024: https://www.ccsa.ca/harm-reduction-whats-name
37. Leone FT, Carlsen K-H, Chooljian D, et al. Recommendations for the appropriate structure, communication, and investigation of tobacco harm reduction claims. An official American Thoracic Society Policy Statement. Am J Resp Crit Care. 2018;198(8):e90-e105. doi:10.1164%2Frccm.201808-1443ST
38. Gallus S, Stival C, McKee M, et al. Impact of electronic cigarette and heated tobacco product on conventional smoking: an Italian prospective cohort study conducted during the COVID-19 pandemic. Tob Control Published Online First: 07 October 2022. doi:10.1136/tc-2022-057368
39. Carreras G, Minardi V, Lugo A, et al. Italians are still loyal to conventional cigarettes, despite novel tobacco products. Ann Ist Super Sanita. 2022;58(4):264-268. doi:10.4415/ANN_22_04_06
40. Pasquereau A, Quatremère G, Guignard R, et al. Groupe Baromètre de Santé publique France 2017. Baromètre de Santé publique France 2017. Usage de la cigarette électronique, tabagisme et opinions

des 18-75 ans. Saint-Maurice: Santé publique France, 2019.
41. González-Marrón A, Koprivnikar H, Tisza J, et al. Tobacco endgame in the WHO European Region: feasibility in light of current tobacco control status. Tob Induc Dis. 2023;21(November):1–16. doi:10.18332/tid/174360
42. Garen L, Schaller K. Strategy for a tobacco-free Germany 2040. German Cancer Research Center, 2021. Accessed 8 January 2024: https://unfairtobacco.org/wp-content/uploads/2022/05/2021_Strategy-for-a-tobacco-free-Germany-2040.pdf